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CORRECTIONS

MONTHLY WEATHER REVIEW, December 1941, vol. 69, page 357, Baguio, P. I., near the middle of the graph, the date "June 14–15" should be "July 14–15"; page 367, table headed LATE REPORTS FOR NOVEMBER 1941, only the data for the last two stations (Pearl Harbor and Swan Island) are for November; the data for all the other stations are for *December* 1941.

January 1942, vol. 70, page 18, the temperature departure for Juneau, Alaska, given as "+.6" should be "+10.6"; page 20, table 2, Cambridge, the departures from weekly means for Jan. 1, 8, 15, and 22, published as +21, +72, +60, and +19, respectively, should be −108, +25, +12, and −21, respectively. The accumulated departure on Jan. 28 should be −644, *not* +1204.

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MONTHLY WEATHER REVIEW

Editor, EDGAR W. WOOLARD

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OBSERVATIONS OF RADIATION PENETRATION THROUGH SNOW

By IRVING F. HAND and ROY E. LUNDQUIST

[U. S. Weather Bureau Solar Radiation Station, Blue Hill Observatory, and U. S. Weather Bureau, Salt Lake City, September 1941]

The penetration of solar radiation through various thicknesses and qualities of snow is of importance in many hydrological and other problems. Previous observations [1] of this penetration with pyrheliometric apparatus have included little if any work in the United States; and the authors therefore made some measurements at Brighton, Utah, as part of a snow project initiated in the Hydrometeorological Section of the Weather Bureau. These measurements constitute only a preliminary study, but the results have been sufficient to show the value that further work would have; data should be obtained under varying conditions of free-air temperature, height above sea-level, wind velocity, humidity, and other meteorological factors, and especially with snows of different densities and physical characteristics.

The phenomena are exceedingly complex. For example, the original loss by reflection from the snow surface nearly always exceeds the amount remaining for transmission and absorption. Considerable work has been done on the albedos, or reflection coefficients.[2] Observations of the reflection of visible radiation from snow surfaces [3] have shown that up to 89 percent of the visible radiation is reflected from clean white snow, whereas only about one-half that amount of the red component may be reflected from the same snow surface. We therefore expect a larger reflection of the visible than of the total solar radiation; numerous measurements of the latter give albedos of from 60 to about 87 percent or more under Arctic conditions.

Extensive studies have been made of the transmission of solar radiation through distilled water.[4] We may assume that fresh snow, when melted, has approximately the same characteristics as distilled water. We therefore might expect radiation absorption in snow to follow a law somewhat like that for absorption in distilled water,

$$I = I_0 e^{-kd}$$

where I_0 is the intensity of the radiation at the surface of the snow times the complement of the albedo, and I is the intensity at depth d, while k is the absorption coefficient; for snow Eckel [1] gives about 0.083 as the value of k.

The instrumental equipment used in the present study consisted of two Eppley total solar and sky radiation pyrheliometers,[5] a dual recording micromax potentiometer with full-scale deflection of 4 millivolts, a bubble sextant for obtaining the height of the sun, a portable potentiometer for checking the action of the recording apparatus, a Weston precision microammeter, and standard snow-depth and density apparatus.

A 10-junction Eppley pyrheliometer was mounted on the roof of the home occupied by Mr. and Mrs. Kenneth Shaw, cooperative observers of the Weather Bureau at Brighton, Utah, at an elevation of nearly 9,000 feet in the Wasatch Mountains, 29 miles from the center of Salt Lake City. The record from this pyrheliometer alternated every 80 seconds with the record obtained by means of a 50-junction Eppley pyrheliometer placed beneath the snow. A pit was dug in the snow with a vertical wall on one side; and in this wall the snow was scooped out, leaving a layer of predetermined thickness above the pyrheliometer, which was mounted in a horizontal position and always at the same distance from the lower side of each layer whose transmission was being studied. A large sheet of beaverboard was used as a door, with snow packed around the edges to eliminate stray light. The use of a 50-junction pyrheliometer, which gives about five-times as great an e. m. f. per gram-calory as the 10-junction, for measuring the greatly diminished intensity of the radiation after its passage through snow, in conjunction with the 10-junction for measuring the total radiation, increased the efficiency of record owing to greater utilization of the record sheet. Just prior to the readings, the recording potentiometer was checked for sensitivity by means of the portable potentiometer; and it also was checked at frequent intervals for galvanometer swing, and against the standard cell.

Preliminary measurements were made on May 14, 15, and 16, 1941, to develop a satisfactory technique of measurement; the results have not been tabulated. On the 17th, a systematic series was made, and the results are shown in table 1 and in the figure; the lower trace shows markedly the effect of lower transmission owing to ice and slush.

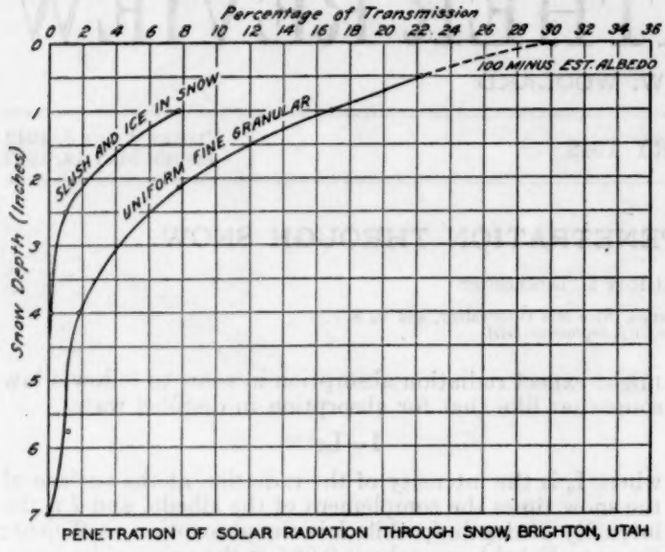
[1] See, e. g.: N. N. Kalitin, Die Strahlungseigenschaften der Schneedecke, *Gerl. Beitr. Geophys.*, 34:354-366, 1931.
Joseph Devaux, L'économie radio-thermique des champs de neige et des glaciers, *Annales de Physique*, (10), 20:5-67, 1933.
Joseph Devaux, Étude de l'Albedo de la neige dans le spectre infrarouge, *C. R.*, 200:80, 1935.
F. Steinhauser, Ein Beitrag zur Anwendung der beschreibenden Statistik in der Klimatologie, *Met. Zeit.*, 52:206-213, 1935.
Hilding Olsson, Radiation measurements on Isachsen's plateau, *Geografiska annaler*, 18:225-244, 1936.
F. Sauberer, Versuche über spektrale Messungen der Strahlungseigenschaften von Schnee und Eis mit Photoelementen, *Met. Zeit.*, 55:250-255, 1938.
C. Thams, Über die Strahlungseigenschaften der Schneedecke, *Gerl. Beitr. Geophys.*, 53:371-388, 1938.
N. N. Kalitin, *Actinometria*, Moscow, 1938.
A. A. Kuzmin, Penetration of temperature fluctuation into snow, *Meteorologia i Hydrologia*, Part 1:11-20, 1939.
O. Eckel und C. Thams, Untersuchungen über Dichte-, Temperatur-, und Strahlungsverhältnisse der Schneedecke in Davos., *Beitr. z. Geologie d. Schweiz*, Geotechn. Serie, Hydrologie, (Zurich), 1939, 273-340.

[2] N. N. Kalitin, The measurements of the albedo of a snow cover, MO. WEA. REV., 58:59-61, 1930, see also Anders Angström, Albedo of various surfaces of ground, *Geografiska annaler*, 7:323-342, 1925. N. N. Kalitin, L'albedo spectral de la couche de neige, *Bull. Cl. sciences math. natr., Sér géogra. géophys.* No. 2-3: 153-163, 1938, Acad. Sciences, Moscow.

[3] H. H. Kimball and I. F. Hand, Reflectivity of different kinds of surfaces, MO. WEA. REV., 57:291-295, 1929, also MO. WEA. REV., 58: 280-282, 1930.

[4] H. R. James, with cooperation of E. H. Birge, A laboratory study of the absorption of light by lake water, *Trans. Wis. Acad. of Sci., Arts and Letters*, Vol. 31, 1938.
E. A. Birge and C. Juday, Solar radiation and inland lakes, Fourth Report, *Trans. Wis. Acad. of Sci., Arts and Letters*, 27:523-562, 1932.
C. Juday, The annual energy budget of an inland lake, *Ecology*, 21: 438-450, 1940.

[5] I. F. Hand, Review of United States Weather Bureau solar radiation investigations, MO. WEA. REV., 65: 415-441, 1937.
B. B. Woertz and I. F. Hand, The characteristics of the Eppley pyrheliometer, MO. WEA. REV., 69: 146-148, 1941.


Percentage of Transmission
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36
100 MINUS EST. ALBEDO
SLUSH AND ICE IN SNOW
UNIFORM FINE GRANULAR
Snow Depth (Inches)
0 1 2 3 4 5 6 7
PENETRATION OF SOLAR RADIATION THROUGH SNOW, BRIGHTON, UTAH

The final series of measurements in table 1 differed from the others in that freshly cut slabs were used by placing them over a recess made in a 34-inch snow pack from which the top 8 inches had been cleaned off. The recess was 6½ inches wide, 11 inches long and 8¾ inches deep, and was located in a snow-area 40 feet from the Shaw house in full exposure to the sun. Considerable difficulty was experienced in placing a ½-inch slab over the top of the recess without breakage; and should additional studies be made, the use of a glass plate of known transmission would greatly simplify the measurements. The pyrheliometer was set up at level each time for the first series of measurements and with only one setting during the next and final series. As before, great care was exercised to keep the same distance between the pyrheliometer and the lower surface of the snow, in order to minimize errors arising from internal reflections within the snow pit.

The first and greatest loss of incident solar radiation is at the surface of the snow, by reflection. A bright snow has albedo of about 87 percent, as does also glare ice; the latter seldom occurs on a snow surface. On the other hand the average reflection coefficients of wet clean and wet dirty snows are comparatively low, as shown by measurements on May 28 and 29 which gave albedos of 44 percent and 34 percent respectively. Dirty snows in and near cities have particularly low reflection and high absorption at the surface. Freshly fallen snow has an almost perfect mat surface, which results in practically identical reflection at all angles of incidence.

The results of these preliminary observations are particularly significant because the tests were conducted under conditions contributing to actual run-off. It has been observed that snow attains an average density of at least 30 percent and usually between 40 and 50 percent before any considerable run-off develops ("snow density" is used here to mean percentage of water per unit volume of snow). Snow density averaged 48 percent at the site; and snow quality for the samples tested averaged 90 percent ice grains, with 10 percent water. The fact that average snow densities do not seem to vary greatly in the process of melting during run-off periods adds to the value of these results.

TABLE 1.—*Penetration of solar radiation through snow at Brighton, Utah*

Date and time	Inches of snow penetrated	Potentiometer scale reading	Gram-calories	Total solar and sky radiation		Percentage transmission	Remarks
				Scale reading	Gram-calories		
	Progressive thicknesses						
May 17 11:52 a. m.	10	0	0	62.2	1.493	.....	½-in. slush layer at 7 in. Fine to medium granular snow.
11:59 a. m.	4	T	T	62.5	1.499	.....	Fine granular snow ½-in. slush layer at bottom.
12:05 p. m.	2½	0.6	0.015	63.1	1.513	1.0	Fine granular snow. Before observation could be made, a ⅛ in. ice layer formed at 1¾ in. from top.
12:07 p. m.	1	4.7	.119	63.3	1.520	7.8	
12:11 p. m.	1	4.7	.119	63.3	1.520	7.8	Fine granular, but slushy.
12:16 p. m.	Mechanical and electrical zero of potentiometer checked.						
	Slab thicknesses						
12:37 p. m.	½	13.5	.342	64.3	1.532	22.3	Uniform, fine granular compact snow, average 45 percent density—from 8 to 16 in. below original snow surface—no ice or slush layers detectable.
12:43 p. m.	1	10.4	.263	64.8	1.555	16.9	
12:46 p. m.	2⅛	4.8	.121	64.7	1.553	7.8	
12:51 p. m.	4	1.1	.028	64.1	1.540	1.8	
12:55 p. m.	5¾	0.7	.018	63.2	1.518	1.2	
1:00 p. m.	7	0	0	61.8	1.485	0	

Densities near the snow surface may vary from as little as 5 percent to as much as 50 percent under the usual natural conditions on a watershed. Under the special conditions at extremely high altitudes or where snow slides produce pressure that consolidates the snow to nearly ice densities, values outside these limits may occur. Thus radiation penetration into snow layers at various seasons, and during changes in density, may be expected to vary widely. Early in our observations, it became apparent that the transmission varies with the average quality of the snow and is particularly influenced by slush or collection of melt-water, and by intermediate ice layers.

It was noted during one series of measurements that radiation passing through a layer of snow gradually decreased; examination revealed the formation of ice and slush at a definite depth. Specifically, from 12:30 to 12:36 p. m. on May 16, using snow 1 inch in thickness, an ice layer ⅛th-inch-thick formed in 6 minutes and gradually reduced transmission by 15 percent. In another instance, on May 17, during a test using initially identical snow slabs of 1-inch thickness, the radiation trans-

mission was reduced during continued exposure of the snow layer to the sun to less than one-half the value obtained in an earlier observation, due to slush forming from melt-water. In another comparison on the same day, where 4 inches of similar fine, granular, compact snow was used for study, transmission through freshly uncovered snow of uniform texture amounted to 1.8 percent of the total solar and sky radiation, whereas after exposure to the sun for about 30 minutes the same type of snow developed a dense ¼-inch thickness of slush at the bottom of the 4-inch layer and reduced transmission to an unmeasurable value.

It may, therefore, be expected that, as snow melt increases near the surface of a firm snow pack at a rate faster than it drains away into the snow, thus forming slush and ice layers, the relative amount of radiation transmitted to greater depths will decrease.

To determine the radiation absorption effect of extraneous matter on snow surfaces, 6 circular plots 18 inches in diameter were each covered with 1 ounce of standard paint pigments. Table 2 lists the pigments used, and shows the relative effects of the various colors. The green showed an absorption nearly equal to that of the black, although the blue showed a greater drop during the first 3 days. One difficulty of this method of test was the uneven distribution of coloring matter after the first few hours. We hope to repeat the experiment under conditions which will minimize many of the errors of this first trial.

TABLE 2.—*Differential absorption tests—Standard paint pigments.*

Date and time	Depth drops in inches							Temperature min. max. 6 p. m.			Wind velocity	Total solar and sky radiation
	General snow cover	Chrome yellow	Venetian red	Lamp black	Chrome green	Ultramarine blue	Orange mineral					
								°F.	°F.	°F.	m. p. h.	gr. cal.
May 14:												
11:45 a. m.	0	0	0	0	0	0	0	31	52	40	3.03	.....
5:40 p. m.	1	1.9	2.9	2.9	2.5	2.0	1.9	.....	.....	.....	.....	301.0
May 15, 5:47 p. m.	3	4.8	5.6	7.8	6.8	6.9	4.3	25	48	42	2.85	584.0
May 16; 6 p. m.	7	8.5	10.2	14.0	13.1	11.0	9.1	28	55	51	3.31	.....
May 18, noon	8.9	12.0	14.4	20.7	19.5	15.0	12.1	.....	.....	.....	.....	.....

NOTES AND REVIEWS

BERNHARD HAURWITZ. **Dynamic Meteorology.** New York (McGraw-Hill Book Co.), 1941. 365 pp.

It is of interest to recall that the first general treatise on meteorology to present the subject from the dynamical viewpoint was the *Lehrbuch der Meteorologie* of A. Sprung, published in 1885; this work remained the only treatise of the kind until the *Dynamische Meteorologie* by F. M. Exner, the second edition of which was published in 1925. Since the appearance of Exner's treatise, notable advances have occurred in theoretical meteorology, and encouraging progress has been made in adapting many of them to daily meteorological practice; and several books on physical and dynamical meteorology have appeared in recent years, although few are in English.

This book collects into one volume, that may be used either as a textbook or as a reference work, a comprehensive account of theoretical meteorology which includes the results of many recent investigations hitherto available only in the widely scattered periodical literature. Numerous references enable the reader to locate further details on nearly every topic; and for the benefit of the student a large number of problems are included. Insofar as any previous knowledge of meteorology is necessary, it is presupposed; and although for convenience brief recapitulations of the needed principles of physics are given, it is likewise presupposed that the reader has been trained in general physics, and in mathematics through the calculus and elementary differential equations.

After an opening chapter occupied by preliminary topics, two chapters are devoted to meteorological statics, including the adiabatic equations and theory of atmospheric stability for both dry and saturated air, and a discussion of surface pressure variations due to advection aloft. The following chapter discusses the energy of thermodynamic processes, equivalent and wet-bulb potential temperatures, convective instability and thermodynamic charts.

Chapter 5 treats the fundamental actuating factor in the physical processes of the atmosphere—solar radiation, its geographical distribution and atmospheric depletion, and the heat balance of the earth; the recent work of Elsasser and others on atmospheric water vapor absorption is included. The next two chapters are devoted to the general dynamical equations of motion of the atmosphere, the fundamental circulation theorems, and the theory of geostrophic winds and other simple types of air motion. In chapter 8, surfaces of discontinuity are discussed; and chapter 9 considers the kinematical analysis of pressure fields.

The next two chapters take up atmospheric turbulence, with its effects on the variation of wind with height and the diurnal variation of the wind, and the effect of turbulent transport of heat, water vapor, and momentum. The following chapter is devoted to the energy of atmospheric motions, and its transformation and dissipation.

The final three chapters consider, respectively, the general circulation; the perturbation method of representing atmospheric motions; and air masses, fronts, cyclones and anticyclones.

CHARLES P. OLIVIER. **Long Enduring Meteor Trains.** Publications of the University of Pennsylvania—The Flower Astronomical Observatory, Reprint No. 60.

This paper, reprinted from *Proc. Amer. Philosophical Soc.* 85: 93–135, 1942, is a catalogue of 1,336 meteor trains which either remained visible for at least 60 seconds or, if of shorter duration, showed actual drift; the catalogue tabulates the salient facts about all the trains, and a further table gives detailed data on heights and drifts for 583 of them.

The data were collected both from the immense number of original records available to the author and from a search of the published literature. The paper provides a fundamental and convenient source of existing information on the phenomena of meteor trains; and as such, it is of importance to the meteorologist interested in any problem involving the motions of the atmosphere at very high levels.

METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR FEBRUARY 1942

[Climate and Crop Weather Division, J. B. KINCER in charge]

AEROLOGICAL OBSERVATIONS

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during February 1942*

Stations with elevations in meters above sea level

Altitude (meters) m. s. l.	Albuquerque, N. Mex. (1,620 m.)				Atlanta, Ga. (300 m.)				Bismarck, N. Dak. (505 m.)				Boise, Idaho (864 m.)				Brownsville, Tex. (6 m.)				Buffalo, N. Y. (221 m.)				Charleston, S. C. (14 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	28	834	2.5	40	28	982	3.4	69	28	958	−8.1	86	28	917	−0.5	76	28	1,015	14.7	87	28	988	−6.5	83	28	1,015	5.0	83
500					28	958	4.0	66									28	957	13.8	79	28	954	−7.7	86	28	956	5.9	66
1,000					28	901	2.4	64	28	899	−9.3	89	28	901	0.2	70	28	902	12.2	72	28	894	−9.9	88	28	899	3.5	60
1,500					28	847	1.6	59	28	842	−9.9	88	28	847	−2.3	66	28	850	11.1	64	28	837	−11.2	86	28	845	1.3	59
2,000	28	796	2.0	40	28	795	0.1	57	28	789	−10.8	85	28	795	−5.2	67	28	800	9.9	56	28	784	−12.0	83	28	794	−0.3	54
2,500	28	748	−1.5	40	28	747	−2.2	54	28	739	−12.8	81	28	745	−8.3	68	28	753	8.0	51	28	734	−13.9	81	28	746	−1.8	50
3,000	28	702	−5.1	41	28	701	−3.9	49	28	692	−15.2	78	28	698	−11.1	66	28	709	6.2	47	28	687	−16.0	77	28	700	−3.6	49
4,000	28	617	−11.8	41	27	617	−8.5	41	28	605	−20.8	75	28	612	−17.0	62	28	627	0.4	49	28	601	−20.8	72	27	616	−8.5	48
5,000	28	541	−18.3	40	26	542	−15.1	40	28	528	−27.4	72	28	535	−23.3	60	28	553	−5.9	52	27	525	−26.6	68	26	541	−14.8	47
6,000	28	472	−24.9	39	26	474	−21.5	36	28	459	−34.5	71	28	466	−30.0	56	27	486	−12.0	54	27	456	−32.9	66	25	473	−21.0	48
7,000	26	411	−31.7	39	26	413	−27.4	35	28	396	−42.2	----	28	404	−37.3	54	26	426	−18.5	51	26	395	−39.4	66	24	413	−27.2	48
8,000	26	356	−38.5	38	23	359	−33.9	34	28	341	−49.1	----	28	349	−44.5	----	24	372	−24.9	50	26	340	−44.8	----	24	358	−34.2	47
9,000	26	307	−44.6	----	23	311	−40.7	----	28	292	−54.5	----	28	299	−50.6	----	23	323	−31.6	50	25	293	−49.6	----	23	309	−41.1	----
10,000	23	264	−49.5	----	23	268	−47.0	----	28	250	−55.8	----	28	256	−54.6	----	23	280	−39.2	----	22	251	−53.0	----	23	266	−47.7	----
11,000	21	226	−53.4	----	21	230	−52.2	----	27	214	−54.5	----	28	220	−55.9	----	23	242	−46.9	----	17	215	−53.7	----	22	229	−52.4	----
12,000	19	193	−53.7	----	21	197	−55.4	----	25	183	−52.7	----	28	188	−55.1	----	21	207	−53.6	----	14	183	−52.2	----	21	196	−55.4	----
13,000	16	165	−54.4	----	20	168	−56.4	----	24	156	−52.0	----	24	160	−53.9	----	21	177	−59.3	----	13	157	−51.4	----	18	167	−57.1	----
14,000	15	141	−56.5	----	20	143	−58.6	----	21	134	−52.6	----	21	137	−53.3	----	20	151	−63.5	----	11	134	−51.9	----	14	142	−59.0	----
15,000	14	120	−59.2	----	18	122	−61.1	----	11	115	−52.9	----	17	118	−53.5	----	20	127	−68.4	----	7	115	−52.8	----	10	121	−61.5	----
16,000	10	102	−61.6	----	16	104	−63.5	----					15	100	−54.4	----	14	108	−73.5	----					5	102	−64.9	----
17,000	10	86	−61.9	----	7	88	−65.9	----					12	86	−54.8	----	10	91	−77.7	----								
18,000	5	73	−63.2	----									5	73	−54.9	----	7	76	−78.6	----								

Altitude (meters) m. s. l.	Denver, Colo. (1,616 m.)				Detroit, Mich. (194 m.)				El Paso, Tex. (1,193 m)				Ely, Nev. (1,908 m.)				Great Falls, Mont. (1,128 m.)				Huntington, W. Va. (172 m.)				Joliet, Ill. (178 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	28	834	−7.4	80	28	992	−5.9	87	28	879	8.2	36	27	805	−4.8	76	28	885	−6.1	72	28	996	−1.0	77	28	996	−4.2	86
500					28	954	−6.9	88													28	956	−2.2	76	28	957	−5.6	89
1,000					28	895	−8.7	84													28	898	−4.8	76	28	897	−7.7	88
1,500					26	839	−9.3	78	28	847	9.1	35					28	844	−5.4	67	28	842	−7.2	77	28	841	−8.1	86
2,000	28	794	−4.7	75	26	786	−11.2	74	28	797	5.9	36	27	796	−4.4	75	28	792	−7.7	65	28	789	−8.5	72	28	789	−8.9	84
2,500	28	744	−6.9	72	26	736	−13.0	70	28	750	2.6	38	27	747	−7.3	73	28	742	−10.8	66	28	740	−10.4	67	28	739	−10.9	80
3,000	28	698	−9.9	69	26	688	−15.1	66	28	704	−.9	39	27	700	−10.7	74	28	695	−13.6	67	28	693	−12.5	64	28	692	−13.3	76
4,000	28	612	−16.8	69	26	602	−20.5	61	28	620	−7.6	40	27	614	−15.9	70	28	608	−20.1	68	28	608	−17.1	57	28	606	−18.8	74
5,000	28	535	−23.1	68	26	525	−26.0	59	27	545	−13.9	39	27	537	−22.5	65	26	531	−26.3	66	28	532	−22.8	55	28	530	−24.7	73
6,000	26	466	−29.6	68	26	456	−32.3	58	27	477	−20.5	37	26	467	−29.2	64	24	462	−33.2	65	28	463	−28.3	52	28	461	−31.0	71
7,000	24	404	−36.9	68	26	394	−39.0	56	27	416	−27.0	37	26	405	−36.5	62	23	399	−40.2	----	28	402	−35.3	51	28	399	−38.1	71
8,000	23	349	−44.2	----	25	340	−44.8	----	27	361	−33.3	38	25	350	−43.1	----	23	344	−47.1	----	26	348	−42.8	----	28	344	−44.5	----
9,000	22	300	−50.0	----	25	292	−49.4	----	26	313	−40.0	39	25	301	−48.6	----	23	295	−52.4	----	26	299	−49.6	----	26	296	−51.0	----
10,000	22	257	−53.6	----	25	250	−52.4	----	26	270	−46.0	----	25	258	−52.3	----	23	253	−55.0	----	26	256	−53.2	----	26	253	−54.9	----
11,000	21	220	−55.5	----	24	215	−52.0	----	26	232	−51.2	----	24	221	−55.1	----	23	216	−55.5	----	25	220	−54.9	----	23	217	−54.9	----
12,000	21	188	−54.8	----	23	184	−50.9	----	26	198	−54.8	----	21	189	−55.2	----	23	185	−54.4	----	21	188	−55.1	----	23	185	−53.3	----
13,000	19	161	−53.5	----	21	157	−50.4	----	25	170	−56.2	----	21	161	−54.3	----	23	158	−52.8	----	17	160	−55.1	----	22	158	−52.9	----
14,000	16	137	−54.5	----	16	135	−50.8	----	23	144	−57.9	----	19	138	−54.5	----	22	136	−52.6	----	13	137	−56.4	----	20	136	−53.4	----
15,000	16	117	−56.7	----	11	115	−52.6	----	20	123	−61.0	----	17	118	−55.7	----	18	116	−52.6	----	10	116	−57.6	----	18	116	−54.5	----
16,000	11	100	−57.9	----	6	99	−55.0	----	16	104	−64.5	----	15	101	−56.7	----	14	99	−53.4	----	5	99	−60.2	----	11	100	−55.4	----
17,000									8	88	−65.6	----	11	86	−57.8	----	6	85	−53.6	----					6	85	−56.1	----
18,000													5	73	−58.7	----												

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during February 1942*—Continued

Altitude (meters) m. s. l.	Lake Charles, La. (6 m.)				Lakehurst, N. J.[1] (39 m.)				Medford, Oreg. (401 m.)				Miami, Fla. (4 m.)				Nashville, Tenn. (180 m.)				Oakland, Calif. (2 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	28	1,017	9.7	84	24	1,009	−1.7	60	28	968	6.0	73	28	1,016	13.9	82	28	996	2.3	70	27	1,016	11.1	74
500	28	958	8.8	71	24	952	−4.0	55	28	957	6.3	71	28	958	14.1	74	28	957	1.3	70	27	957	9.1	71
1,000	28	902	6.8	67	24	893	−6.0	57	28	900	3.7	71	28	903	11.6	70	28	900	−1.0	69	27	901	6.0	72
1,500	28	849	5.3	60	24	838	−7.2	58	28	846	0.1	77	28	851	9.9	63	28	845	−2.2	65	27	847	3.5	67
2,000	28	798	4.3	58	24	786	−8.4	55	27	794	−3.3	79	28	801	9.0	55	28	793	−3.3	58	27	796	1.2	58
2,500	28	750	3.1	53	24	736	−10.8	52	27	745	−6.1	70	28	754	7.5	50	28	744	−5.4	53	27	748	−1.8	52
3,000	28	705	1.2	49	24	689	−12.9	50	27	699	−8.8	61	28	709	5.4	47	28	698	−7.3	47	27	702	−4.7	48
4,000	28	622	−4.1	48	24	603	−18.2	45	27	613	−14.6	52	28	627	0.2	46	27	613	−12.0	42	27	618	−10.5	44
5,000	28	547	−10.1	45	24	527	−24.3	43	26	537	−21.4	49	28	553	−5.3	45	26	538	−17.5	40	26	542	−16.9	42
6,000	28	480	−17.0	43	24	459	−30.6	42	26	468	−28.8	46	26	486	−11.3	41	23	470	−23.8	38	25	474	−24.2	42
7,000	27	419	−23.4	43	23	398	−37.0	38	25	406	−36.4	45	26	426	−17.8	40	21	409	−30.6	37	25	412	−31.7	42
8,000	27	365	−30.2	44	23	344	−43.5	----	24	350	−44.0	----	25	372	−24.6	39	21	354	−37.5	37	25	356	−39.5	42
9,000	27	316	−37.2	42	23	296	−48.3	----	24	301	−50.8	----	25	323	−31.8	39	20	306	−43.5	----	24	307	−46.9	----
10,000	27	273	−44.5	----	22	254	−51.0	----	24	258	−56.3	----	25	280	−39.3	----	16	263	−48.4	----	23	264	−53.7	----
11,000	26	234	−51.0	----	21	218	−52.1	----	23	220	−59.7	----	23	242	−46.1	----	15	226	−51.1	----	23	226	−58.1	----
12,000	25	200	−55.1	----	21	187	−52.1	----	23	188	−59.7	----	20	207	−51.8	----	13	194	−51.4	----	20	193	−58.9	----
13,000	24	171	−58.5	----	20	160	−53.0	----	23	160	−58.6	----	20	177	−56.3	----	10	165	−51.7	----	20	164	−57.5	----
14,000	23	146	−62.3	----	18	138	−54.1	----	22	136	−58.0	----	19	151	−60.4	----	7	142	−53.9	----	20	140	−57.3	----
15,000	18	124	−66.5	----	12	118	−55.7	----	21	116	−58.7	----	19	128	−64.3	----	6	121	−56.3	----	18	119	−58.0	----
16,000	15	105	−69.7	----					12	99	−58.9	----	16	109	−68.8	----					14	102	−59.2	----
17,000	13	88	−71.6	----					10	84	−59.5	----	11	92	−73.0	----					9	87	−60.7	----
18,000	6	74	−73.5	----																	6	74	−61.3	----

Altitude (meters) m. s. l.	Oklahoma City, Okla. (391 m.)				Omaha, Nebr., (301 m.)				Pensacola, Fla.[1] (24 m.)				Phoenix, Ariz. (339 m.)				Portland, Maine (20 m.)				St. Louis, Mo. (171 m.)				St. Paul, Minn. (225 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	26	971	3.2	77	28	983	−4.0	86	23	1,017	8.6	69	28	973	9.7	52	28	1,005	−6.5	70	28	997	0.4	79	28	993	−5.8	78
500	26	958	3.8	75	28	958	−4.1	82	23	960	7.0	56	28	955	13.9	46	28	945	−8.2	75	28	956	−.6	78	28	958	−7.4	81
1,000	26	901	2.1	71	28	899	−5.5	78	23	903	5.8	47	28	899	11.3	41	28	886	−10.2	76	28	899	−2.7	77	28	898	−9.7	82
1,500	26	846	0.9	63	28	844	−6.0	71	23	850	5.0	45	28	847	7.6	40	28	830	−11.3	79	28	844	−4.5	74	28	842	−10.3	80
2,000	26	795	−0.9	59	28	791	−7.5	67	23	799	3.4	45	28	796	3.9	41	28	778	−12.5	77	28	792	−5.4	68	28	789	−11.4	77
2,500	26	747	−3.1	52	28	742	−9.9	65	22	751	1.7	42	28	749	.2	42	28	728	−14.3	74	28	742	−7.9	66	28	739	−13.2	74
3,000	26	700	−5.8	49	28	695	−12.1	61	22	706	−.4	43	27	703	−3.3	43	28	682	−16.5	73	28	696	−9.9	63	28	692	−15.7	72
4,000	26	616	−11.3	45	28	609	−17.5	57	18	622	−4.9	45	26	619	−9.3	40	27	596	−22.0	71	28	610	−14.8	58	28	605	−20.8	62
5,000	26	540	−17.6	43	28	532	−23.6	56	14	547	−10.0	53	26	543	−15.6	38	27	519	−28.1	67	27	534	−20.9	53	28	528	−26.6	57
6,000	25	472	−24.5	40	28	464	−30.5	54	13	480	−16.0	58	26	475	−22.3	39	27	451	−34.7	64	27	466	−27.7	49	28	459	−33.4	55
7,000	24	410	−31.6	40	28	402	−37.7	53	9	420	−22.2	54	25	414	−29.5	39	27	390	−41.2	----	27	404	−34.8	47	26	397	−41.0	----
8,000	24	355	−38.6	40	27	346	−44.8	----					24	359	−36.8	38	26	336	−46.0	----	27	349	−41.5	----	26	341	−48.2	----
9,000	24	306	−45.4	----	27	298	−50.7	----					24	310	−43.2	----	24	289	−48.8	----	27	301	−47.5	----	25	292	−53.9	----
10,000	24	264	−51.1	----	27	253	−54.1	----					23	267	−48.9	----	22	248	−50.3	----	26	259	−52.1	----	24	250	−56.5	----
11,000	23	226	−55.3	----	27	219	−54.2	----					21	229	−53.2	----	20	213	−50.8	----	26	222	−54.1	----	24	214	−54.8	----
12,000	23	193	−56.4	----	27	187	−52.7	----					21	196	−55.0	----	18	183	−50.5	----	24	189	−53.7	----	24	183	−52.8	----
13,000	20	165	−56.3	----	26	160	−52.7	----					20	168	−56.0	----	14	156	−51.2	----	22	162	−53.4	----	22	156	−51.9	----
14,000	19	140	−57.3	----	23	137	−53.5	----					19	143	−56.9	----	12	134	−51.8	----	15	138	−54.8	----	21	134	−52.5	----
15,000	18	119	−59.5	----	20	118	−54.6	----					18	122	−59.3	----	7	114	−53.0	----	12	118	−55.3	----	18	114	−53.4	----
16,000	15	102	−61.4	----	13	100	−55.9	----					16	104	−60.8	----					5	101	−55.8	----	15	98	−54.3	----
17,000	12	86	−62.9	----	8	86	−56.7	----					10	89	−62.4	----									7	84	−55.4	----
18,000	5	73	−63.0	----																								

Altitude (meters) m. s. l.	San Antonio, Tex., (175 m.)				San Diego, Calif.,[1] (19 m.)				Sault Ste Marie, Mich., (221 m.)				Seattle, Wash.,[1] (27 m.)				Spokane, Wash., (598 m.)				Washington, D. C. (25 m.)				Anchorage, Alaska (42 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	28	996	11.7	70	27	1,012	12.6	77	28	991	−0.1	83	27	1,015	4.0	90	28	946	−0.7	84	28	1,012	0.3	56	28	1,000	−0.1	80
500	28	958	11.3	66	27	956	11.0	59	28	956	−10.1	84	27	957	3.0	81					28	953	−2.2	57	28	944	.4	73
1,000	28	902	8.8	66	27	900	8.8	47	28	896	−11.5	85	27	900	−.1	80	28	900	−1.3	82	28	895	−4.7	59	28	887	−1.7	71
1,500	28	850	7.5	63	27	847	5.8	41	28	839	−12.1	84	27	845	−2.8	76	28	845	−4.3	80	28	839	−6.1	60	28	832	−4.9	72
2,000	28	799	6.7	53	27	797	3.2	38	28	786	−13.4	80	27	793	−5.5	73	28	792	−7.2	80	28	787	−7.8	59	28	781	−8.3	74
2,500	28	751	4.7	50	27	748	.8	35	28	736	−15.5	77	27	744	−8.5	70	28	743	−9.6	78	28	738	−9.9	57	28	732	−11.2	74
3,000	28	707	2.3	48	26	703	−1.8	32	28	688	−18.0	76	27	697	−11.2	67	28	696	−12.6	76	28	691	−12.0	55	28	686	−14.5	73
4,000	27	624	−3.0	47	26	619	−8.2	31	26	601	−23.4	73	27	611	−17.6	67	28	610	−18.7	70	26	605	−17.5	53	28	600	−20.8	72
5,000	27	549	−9.0	44	25	543	−14.8	31	25	524	−29.3	71	27	534	−24.4	65	26	533	−24.9	63	26	530	−22.7	49	28	523	−27.4	67
6,000	25	482	−15.3	43	25	475	−22.6	42	23	455	−36.3	73	27	464	−31.7	66	26	464	−31.6	60	24	462	−28.6	47	28	454	−34.3	65
7,000	23	421	−22.0	43	24	414	−29.7	45	22	392	−43.1	...	26	402	−39.2	66	26	401	−39.3	59	22	409	−35.2	46	27	393	−41.8	----
8,000	20	367	−28.8	42	12	361	−36.2	...	21	337	−49.4	...	26	347	−46.7	...	26	346	−46.5	...	22	346	−41.8	...	27	338	−48.3	----
9,000	20	318	−35.9	41	12	310	−42.8	...	17	288	−53.3	...	24	297	−52.7	...	25	297	−52.3	...	22	298	−47.8	...	27	290	−53.0	----
10,000	18	275	−42.3	...	9	265	−48.5	...	14	248	−52.4	...	22	255	−56.6	...	25	254	−56.0	...	17	256	−51.6	...	27	248	−55.2	----
11,000	15	237	−48.5	...	5	228	−51.8	...	12	213	−50.4	...	22	218	−58.4	...	24	217	−57.0	...	16	220	−53.7	...	25	213	−54.3	----
12,000	12	203	−53.5	...					12	183	−49.3	...	19	186	−57.8	...	23	186	−56.4	...	14	188	−53.6	...	25	182	−52.3	----
13,000	7	173	−56.7	...					11	157	−49.2	...	15	159	−56.6	...	23	158	−54.7	...	13	161	−53.4	...	24	156	−51.0	----
14,000	7	148	−59.9	...					10	135	−49.6	...	11	135	−56.2	...	22	135	−54.4	...	10	138	−54.0	...	23	134	−50.0	----
15,000	5	125	−63.3	...					5	116	−50.6	...	7	115	−55.4	...	20	116	−54.9	...	8	117	−55.1	...	21	115	−49.6	----
16,000																	16	99	−55.6	...	8	100	−56.0	...	19	98	−49.6	----
17,000																	12	85	−56.4	...	6	85	−56.8	...	11	85	−49.2	----
18,000																	5	73	−57.0	...					6	73	−48.7	----

[1] Navy stations.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during February 1942*—Continued

Altitude (meters) m. s. l.	Barrow, Alaska, (6 m.)				Bethel, Alaska, (7 m.)				Fairbanks, Alaska, (156 m.)				Juneau, Alaska, (49 m.)				Ketchikan, Alaska, (26 m.)				Nome, Alaska, (14 m.)				San Juan, P. R., (15 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	28	1,018	−22.7	90	28	998	−4.8	80	28	989	−8.0	72	27	1,008	2.5	81	28	1,012	4.2	78	16	1,002	−9.7	74	28	1,013	23.4	84
500	28	953	−18.6	91	28	938	−3.6	79	28	947	−6.9	75	27	953	0.2	79	28	956	2.0	78	16	941	−9.2	79	28	959	20.4	87
1,000	28	891	−16.0	85	28	880	−4.8	79	28	888	−5.9	77	27	895	−2.8	81	28	898	−0.9	75	16	882	−9.0	79	28	905	16.9	86
1,500	28	833	−16.8	82	28	825	−7.5	79	28	833	−6.1	75	27	840	−5.4	80	28	843	−3.6	73	16	827	−9.5	76	28	854	14.0	81
2,000	28	780	−18.2	78	28	774	−10.0	77	28	781	−8.6	73	27	788	−7.8	76	28	791	−6.2	70	16	775	−11.5	71	28	804	11.9	70
2,500	28	729	−20.1	75	28	725	−13.0	74	28	732	−11.6	72	26	738	−10.3	74	28	742	−8.7	65	16	725	−14.1	64	28	758	10.5	53
3,000	28	681	−22.6	74	27	678	−16.1	73	28	686	−14.9	71	26	692	−13.1	72	28	695	−11.3	63	16	679	−17.0	60	28	713	8.8	41
4,000	28	593	−28.1	72	27	593	−22.6	69	28	599	−21.4	71	25	606	−19.1	70	28	609	−17.8	63	15	593	−23.2	55	28	631	3.7	34
5,000	28	515	−33.9	70	27	517	−28.9	65	28	523	−28.1	70	24	529	−25.4	69	27	532	−24.1	61	15	517	−29.6	55	27	558	−1.2	26
6,000	28	446	−40.3	----	26	449	−35.9	64	27	454	−34.8	69	23	460	−32.4	64	27	463	−30.4	61	15	449	−36.2	55	25	491	−7.2	22
7,000	28	385	−45.5	----	25	388	−42.6	----	27	393	−41.7	----	23	398	−39.4	63	27	401	−37.0	60	13	387	−43.2	----	24	431	−14.1	21
8,000	28	331	−49.4	----	25	334	−48.6	----	27	338	−48.2	----	22	343	−46.5	----	25	347	−43.6	----	12	333	−49.8	----	23	378	−21.3	20
9,000	27	284	−50.8	----	24	286	−52.8	----	27	290	−53.5	----	21	295	−52.8	----	23	298	−49.9	----	12	285	−54.4	----	23	328	−28.8	20
10,000	23	244	−49.6	----	24	246	−53.2	----	26	248	−55.5	----	20	252	−57.1	----	20	255	−54.6	----	12	244	−52.5	----	23	285	−36.5	20
11,000	19	210	−47.5	----	23	211	−50.5	----	25	212	−54.0	----	17	215	−58.9	----	18	219	−55.8	----	11	210	−48.3	----	19	247	−42.6	----
12,000	17	180	−46.0	----	20	181	−48.5	----	25	181	−51.5	----	13	183	−56.9	----	16	186	−54.8	----	9	180	−46.0	----	16	213	−47.7	----
13,000	15	155	−45.4	----	17	155	−47.2	----	25	156	−49.4	----	8	155	−52.5	----	15	159	−53.6	----	7	155	−45.2	----	15	182	−54.4	----
14,000	10	133	−45.2	----	12	133	−46.6	----	21	134	−49.0	----	6	131	−50.3	----	14	136	−51.9	----	----	----	----	----	12	156	−61.7	----
15,000	5	115	−45.6	----	7	115	−46.4	----	14	115	−49.2	----	----	----	----	----	11	117	−51.1	----	----	----	----	----	8	132	−69.0	----
16,000	----	----	----	----	----	----	----	----	12	98	−49.5	----	----	----	----	----	10	100	−51.3	----	----	----	----	----	5	110	−76.1	----
17,000	----	----	----	----	----	----	----	----	6	84	−49.5	----	----	----	----	----	5	85	−50.6	----	----	----	----	----	----	----	----	----

All observations taken at 11 p. m., 75th meridian time, except at Seattle, Wash., where they are taken about 6 a. m., E. S. T.

None of the means included in this table are based on less than 15 surface or 5 standard level observations.

Number of observations refers to pressure only, as temperature and humidity data are missing for some observations at certain levels; also, the humidity data are not used in daily observations when the temperature is below −40.0° C.

LATE REPORTS

Altitude (meters) m. s. l.	DECEMBER 1941								YEAR 1941							
	Barrow, Alaska (6 m.)				Bethel, Alaska (7 m.)				Barrow, Alaska (6 m.)				Bethel, Alaska (7 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	1,006	−20.4	88	31	995	−8.9	74	365	1,016	−12.0	91	355	1,005	0.6	76
500	30	943	−16.9	87	31	934	−4.6	71	365	953	−9.7	85	355	946	1.1	74
1,000	30	881	−16.4	84	31	877	−6.1	69	365	893	−8.9	77	355	888	−0.9	74
1,500	30	825	−17.0	80	31	822	−8.6	64	365	837	−9.6	71	355	834	−3.3	72
2,000	30	771	−18.6	72	31	770	−11.5	60	365	784	−11.3	68	355	783	−6.1	70
2,500	30	721	−21.0	67	31	722	−14.5	59	365	734	−13.6	66	355	734	−8.8	67
3,000	30	673	−23.8	66	31	675	−17.4	58	365	687	−16.2	64	351	688	−11.7	64
4,000	29	586	−30.2	65	31	590	−23.8	54	363	601	−21.9	61	349	603	−17.7	60
5,000	29	508	−37.1	66	31	514	−30.4	52	359	524	−28.3	59	344	527	−24.1	57
6,000	29	439	−43.8	----	30	446	−37.0	----	356	455	−35.0	55	339	458	−30.8	54
7,000	29	378	−50.0	----	28	385	−43.2	----	353	393	−41.7	----	334	397	−37.4	----
8,000	29	324	−54.8	----	28	331	−48.5	----	350	338	−47.7	----	329	343	−43.7	----
9,000	29	276	−56.8	----	28	284	−52.3	----	346	290	−51.7	----	322	295	−48.3	----
10,000	29	236	−57.0	----	28	243	−54.0	----	340	249	−52.5	----	316	253	−50.2	----
11,000	29	202	−55.9	----	27	208	−53.1	----	331	214	−50.9	----	313	218	−49.7	----
12,000	27	173	−55.2	----	27	178	−51.4	----	320	183	−49.5	----	305	187	−48.3	----
13,000	24	148	−55.5	----	27	153	−51.2	----	308	157	−49.1	----	291	160	−47.4	----
14,000	14	126	−56.0	----	25	131	−50.5	----	277	135	−49.2	----	278	138	−47.2	----
15,000	9	108	−57.1	----	21	112	−49.9	----	250	116	−49.4	----	251	118	−47.2	----
16,000	----	----	----	----	12	96	−49.2	----	207	100	−48.9	----	213	102	−47.4	----
17,000	----	----	----	----	10	83	−49.1	----	----	----	----	----	171	88	−47.5	----
18,000	----	----	----	----	5	71	−49.0	----	----	----	----	----	117	75	−47.7	----

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during February 1942*—Continued

LATE REPORTS—Continued

JANUARY 1942

Altitude (meters) m. s. l.	Bethel, Alaska (7 m.)				San Juan, P. R. (15 m.)				Swan Island, West Indies (10 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	28	996	−4.7	75	31	1,016	23.7	85	31	1,015	24.8	79
500	28	937	−2.4	72	31	961	21.0	82	31	960	21.9	82
1,000	28	880	−3.6	71	31	907	17.6	84	31	906	18.5	83
1,500	27	825	−6.3	71	31	856	14.7	82	31	855	15.5	81
2,000	27	774	−9.5	71	31	806	12.3	74	31	805	13.1	73
2,500	27	725	−12.4	69	31	759	10.5	58	31	759	11.0	64
3,000	26	679	−15.5	68	30	715	8.5	44	31	714	8.9	55
4,000	26	594	−21.7	66	29	633	3.9	32	31	633	4.2	46
5,000	25	517	−28.1	63	28	559	−1.3	25	30	559	−0.6	38
6,000	25	449	−34.7	62	27	493	−7.0	20	30	493	−7.0	32
7,000	25	388	−41.2	----	26	433	−13.8	19	29	433	−13.7	24
8,000	25	334	−47.0	----	26	379	−21.3	19	29	379	−20.5	20
9,000	25	287	−50.4	----	25	330	−28.5	18	28	330	−28.0	19
10,000	24	246	−51.4	----	25	287	−35.4	18	28	287	−35.7	18
11,000	24	212	−51.0	----	24	248	−42.8	----	28	248	−43.3	----
12,000	23	181	−49.4	----	20	213	−49.7	----	27	213	−50.9	----
13,000	22	155	−48.7	----	20	183	−56.4	----	27	182	−58.3	----
14,000	20	133	−48.2	----	18	156	−62.2	----	27	155	−65.4	----
15,000	12	114	−47.6	----	18	132	−68.2	----	25	131	−72.0	----
16,000	9	98	−47.8	----	15	112	−73.4	----	24	111	−78.5	----
17,000					13	93	−78.3	----	20	93	−85.0	----
18,000					11	78	−82.1	----	13	78	−87.5	----
19,000					7	66	−82.2	----				
20,000					6	55	−77.9	----				

TABLE 2.—*Free-air resultant winds based on pilot balloon observations made near 5 p. m. (75th meridian time) during February, 1942. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°)—Velocities in meters per second*

Altitude (meters) m. s. l.	Albilene, Tex. (537 m.)			Albuquerque, N. Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (866 m.)			Brownsville, Tex. (7 m.)			Buffalo, N. Y. (220 m.)			Burlington, Vt. (132 m.)			Charleston, S. C. (17 m.)			Chicago, Ill. (192 m.)			Cincinnati, Ohio (152 m.)			Denver, Colo. (1,627 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	27	240	2.0	28	263	2.1	25	308	3.7	27	265	2.8	28	354	0.1	26	10	0.4	24	84	2.3	26	280	4.4	26	327	2.2	24	269	2.1	24	328	2.0	26	306	1.9	25	95	1.5
500							25	306	5.6										24	95	3.4	26	278	4.8	26	307	5.6	24	253	4.2	24	338	2.4	26	298	2.8						
1,000	27	223	2.7				24	297	5.8				28	254	1.1	26	289	.6	18	29	1.1	17	288	7.0	23	313	7.2	24	263	5.4	19	294	3.0	23	272	2.6						
1,500	27	232	4.1				22	300	8.4	27	273	5.3	20	268	3.4	26	265	1.5	16	283	3.9	11	308	6.6	20	326	8.1	23	278	7.6	13	281	4.6	19	280	3.9						
2,000	27	245	5.8	28	266	3.5	20	297	10.6	26	284	6.8	13	265	5.7	23	287	2.7	12	296	7.7	10	322	9.4	11	335	12.6	21	286	10.7				15	307	5.9	25	73	.9
2,500	25	269	9.1	27	262	7.2	18	296	12.6	25	291	7.9	11	284	7.4	21	290	4.1										21	283	14.7				13	293	8.3	23	275	1.6
3,000	24	270	12.4	27	263	9.5	17	292	15.4	20	283	7.8				20	305	4.7										20	280	16.2							22	281	5.7
4,000	23	275	18.1	23	270	12.6	16	283	20.8	18	295	8.3				15	329	5.7										18	280	23.7							21	289	9.6
5,000	21	273	22.7	21	266	18.0	15	281	26.0	14	320	10.7				12	309	7.2										15	278	27.5							19	287	13.4
6,000	19	274	25.6	20	266	22.0	14	282	32.9	12	331	10.9				10	332	9.5										12	277	29.1							16	284	17.5
8,000	12	270	33.0	14	264	26.8																															11	275	19.5

Altitude (meters) m. s. l.	El Paso, Tex. m. s. l. (1,196 m.)			Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,413 m.)			Greensboro, N. C. (271 m.)			Havre, Mont. (767 m.)			Jacksonville, Fla. (16 m.)			Las Vegas, Nev. (570 m.)			Little Rock, Ark. (88 m.)			Medford, Oreg. (410 m.)			Miami, Fla. (10 m.)			Minneapolis, Minn. (265 m.)			Mobile Ala. (66 m.)			Nashville Tenn. (194 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	28	270	2.9	26	354	1.4	27	333	0.7	26	289	3.0	25	256	1.7	24	316	2.4	28	40	2.4	26	145	0.3	27	302	0.5	23	45	1.3	25	349	1.6	24	343	1.9	25	311	2.0
500										26	294	5.3				24	292	3.8				26	218	.6	27	289	.6	23	53	1.4	25	354	1.8	24	344	1.7	25	289	2.6
1,000										26	287	6.5	25	255	3.7	24	284	4.8	28	48	1.6	21	241	2.8	27	190	.9	23	243	1.0	23	4	1.6	21	314	3.0	21	257	3.9
1,500	28	271	3.4				26	294	7.9	24	271	6.3	21	299	8.0	28	336	0.4	18	282	4.9	27	216	2.5	21	278	3.7	19	1	1.8	20	312	5.0	18	278	5.3
2,000	28	261	4.2	26	354	1.6	27	309	.4	23	296	10.9	22	277	6.4	20	293	10.6	28	260	2.2	17	289	8.4	26	233	2.6	20	276	6.1	13	337	4.7	19	304	7.1	13	291	8.5
2,500	27	257	6.6	26	319	1.9	26	258	1.6	20	300	13.3	21	284	7.2	18	290	13.5	27	267	4.5	16	286	10.2	20	320	2.5	17	272	9.6	11	350	6.9	19	288	10.7	11	293	11.1
3,000	25	262	10.4	26	294	3.0	26	259	3.2	20	294	14.8	20	289	7.7	18	286	16.3	27	285	5.8	13	284	12.4	15	353	6.3	15	274	12.1	10	341	7.1	19	279	13.9	10	300	14.9
4,000	22	269	14.5	19	288	6.3	21	271	9.5	18	293	21.7	18	298	7.4	16	284	21.6	26	300	10.7	10	275	15.0	12	357	11.6	15	275	14.5				18	279	18.6			
5,000	21	269	19.6	15	278	9.3	15	286	13.5	15	290	29.9	14	319	9.2	13	284	25.0	23	301	15.2				11	355	15.0	13	272	18.2				12	270	20.6			
6,000	20	266	22.6	14	274	12.2	11	296	17.0	14	294	36.0				10	281	30.0	21	304	19.4				11	348	14.6	13	275	22.8									
8,000	13	270	29.8	11	280	13.3													19	298	26.3																		
10,000																			14	284	33.6																		

TABLE 2.—*Free-air resultant winds based on pilot balloon observations made near 5 p. m. (75th meridian time) during February, 1942. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°)—Velocities in meters per second*—Continued

Altitude (meters) m. s. l.	New York, N. Y. (15 m.)			Oakland, Calif. (8 m.)			Oklahoma City, Okla. (402 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (338 m.)			Rapid City, S. Dak. (982 m.)			St. Louis, Mo. (181 m.)			San Antonio, Tex. (180 m.)			San Diego, Calif. (15 m.)			Sault St. Marie, Mich. (230 m.)			Seattle, Wash. (12 m.)			Spokane, Wash. (603 m.)			Washington, D. C. (24 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	27	313	7.9	26	268	1.6	24	291	1.1	24	32	2.5	28	274	1.3	24	359	3.1	24	267	1.0	26	73	1.0	27	284	3.8	24	317	4.1	28	290	0.5	22	119	0.7	27	293	5.2
500	26	304	8.2	26	295	1.6	24	291	1.3	24	3	3.4	28	278	1.8				24	277	2.7	26	88	0.8	27	288	3.3	24	337	6.6	28	180	1.3				27	291	7.0
1,000	25	310	10.3	25	303	1.5	24	247	1.7	20	339	1.4	28	284	1.4	24	358	3.2	20	255	4.5	25	230	1.1	24	289	1.3	23	6	5.4	20	178	2.4	22	167	1.3	27	298	8.6
1,500	21	315	12.8	24	344	2.5	22	244	3.9	18	306	3.7	28	243	2.0	24	322	4.4	19	269	7.2	22	271	4.1	24	315	1.3	20	9	6.2	16	172	2.5	21	201	2.4	26	302	11.1
2,000	12	309	13.2	21	338	5.2	21	265	6.4	14	297	5.3	26	264	4.2	22	316	5.3	15	275	9.0	18	279	7.4	23	334	1.6	19	1	6.9	13	200	3.2	14	225	2.0	24	301	11.9
2,500				18	347	7.2	21	272	8.9	13	299	6.8	24	270	5.2	20	298	6.8	14	282	11.6	18	274	11.4	19	308	3.9	18	357	6.7	12	215	1.9	11	274	3.2	19	301	13.7
3,000				18	345	9.4	19	274	11.2	12	298	8.2	24	282	7.4	17	300	7.5	13	283	12.9	17	273	14.3	18	305	7.3	17	341	5.5				10	301	4.7	17	295	15.7
4,000				17	345	13.5	16	286	15.2	10	296	11.3	22	284	11.0	14	304	8.9	12	293	16.5	15	274	19.4	16	300	10.9	12	331	9.2				10	312	5.6	17	293	19.3
5,000				14	342	15.9	15	285	20.0	10	301	14.0	20	275	14.7	10	286	12.8	12	289	20.5	14	270	23.2				11	337	8.5							13	289	24.9
6,000				11	351	17.2	13	274	22.6	10	297	17.9	18	274	19.3							11	267	25.6				10	333	7.2							13	291	30.9
8,000													15	267	22.7																							

TABLE 3.—*Maximum free-air wind velocities (m. p. s.), for different sections of the United States, based on pilot balloon observations during February 1942*

Section	Surface to 2,500 meters (m. s. l.)					Between 2,500 and 5,000 meters (m. s. l.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station
Northeast [1]	49.2	NW	2,080	13	Hartford, Conn.	43.5	WSW	3,740	17	Portland, Maine	90.8	W	9,740	18	Portland, Maine.
East-Central [2]	40.0	NNW	2,190	7	Raleigh, N. C.	60.0	W	5,000	19	Washington, D. C.	80.2	WNW	7,920	13	Hatteras, N. C.
Southeast [3]	34.9	WSW	2,500	6	Atlanta, Ga.	46.5	WSW	3,630	17	Montgomery, Ala.	68.4	W	8,750	2	Jacksonville, Fla.
North-Central [4]	25.1	WNW	2,500	18	Madison, Wis.	40.4	W	4,920	16	Bismarck, N. Dak.	58.8	WNW	10,550	6	Rapid City, S. Dak.
Central [5]	31.8	NNW	1,000	23	Dodge City, Kans.	39.0	NW	4,970	4	Wichita, Kans.	56.4	W	10,710	7	Wichita, Kans.
						39.0	WNW	4,860	19	St. Louis, Mo.					
South-Central [6]	37.7	NW	1,340	23	Abilene, Tex.	46.0	WNW	4,800	23	Abilene, Tex.	83.7	WNW	13,460	21	Abilene, Tex.
Northwest [7]	36.2	E	460	2	Tatoosh, Wash.	36.9	NNE	5,000	13	Medford, Oreg.	60.2	NNE	9,300	13	Medford, Oreg.
West-Central [8]	45.5	NNE	1,360	13	Oakland, Calif.	49.7	N	5,000	12	Redding, Calif.	90.0	NNE	7,690	13	Redding, Calif.
Southwest [9]	33.2	SSW	2,100	14	Roswell, N. Mex.	65.5	WSW	5,000	22	Roswell, N. Mex.	91.0	W	10,990	23	Las Vegas, Nev.

[1] Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania and Northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, Southern Ohio, Kentucky, Eastern Tennessee and North Carolina.
[3] South Carolina, Georgia, Florida and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas and Missouri.
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and Western Tennessee.
[7] Montana, Idaho, Washington and Oregon.
[8] Wyoming, Colorado, Utah, Northern Nevada and Northern California.
[9] Southern California, Southern Nevada, Arizona, New Mexico, and extreme West Texas.

RIVER STAGES AND FLOODS

By BENNETT SWENSON

During February 1942, severe flooding occurred in the Sacramento Valley, with an estimated loss of more than $1,800,000. Other floods, which were mostly light to moderate, were experienced principally along the Atlantic Seaboard from North Carolina southward and southwestward through Georgia and Alabama, in the Wabash and Illinois River basins and in portions of the North Pacific drainage.

St. Lawrence drainage.—Slight flooding occurred in the Maumee River basin early in the month, resulting largely from heavy rains on February 4. Precipitation was again heavy on February 6, but was mostly in the form of snow and was followed by colder weather. As a result, surface run-off was checked and the river crested at Fort Wayne, Ind., on the morning of February 7 at a stage of 15.7 feet, 0.7 foot above flood stage, but did not reach flood stage at downstream stations.

Atlantic Slope drainage.—Two periods of rain occurred in February which caused flooding in the streams from the Neuse and Cape Fear Rivers in North Carolina southward. The overflows were light to moderate and were caused largely by heavy rains during the first period, February 16 and 17. Heavy rains occurred also on the 24th and caused further rises or served to prolong the flooding especially in the Savannah and Altamaha Rivers. The damage caused by these floods was small.

The snow cover was moderately heavy during the month over northern New England and portions of northern New York. In other portions of the North Atlantic drainage the snow cover was mostly below normal.

In the Connecticut River basin above Hartford, Conn., the snow depth on February 28 averaged approximately 16 inches, with an average water content of 3.66 inches.

Precipitation during February was mostly below normal in the Susquehanna River basin. The heaviest snowfall of the month occurred on the 7th–8th, ranging from 2 to 20 inches in the upper basin. Slight rises occurred in the rivers on the 8th and the 18th, but at the end of the month, stream flow was only slightly higher than at the beginning of the month.

East Gulf of Mexico drainage.—Slight overflows occurred in the Chattahoochee, Apalachicola, Coosa, Etowah, and Oostanaula Rivers from heavy rains on February 16 and 17. Very little damage resulted from these overflows.

In the Black Warrior and Tombigbee Rivers, rain averaging 3 inches over the watersheds of both rivers occurred on the 16th–17th. The heaviest 24-hour amounts reported were 3.8 inches at Oneonta, Ala., and 4.1 inches at Lock No. 17. Both of these stations are on the Black Warrior north of Tuscalloosa, Ala., where the river rose 38 feet in 24 hours, from 7 a. m. of the 16th to 7 a. m. of the 17th, reaching a crest of 53.5 feet by 9. p m. of the 17th. An unprecedented rise of 8 feet occurred at Tuscaloosa between 6 and 7 p. m., February 16. The previous maximum rise of record in 1 hour at that place was 5 feet. The damage from the overflows was comparatively light, amounting to $2,200.

Upper Mississippi River basin.—From a snow survey of the Mississippi River watershed above La Crosse, Wis., made by that office on February 15, the average winter precipitation since November 1 was 2.07 inches. This indicates a decided deficiency in moisture and it is about one-third of the precipitation during the same period in the 1940–41 season. The average water content of the snow was 0.3 inch, compared to slightly over 2 inches at the same time last year.

Flood stages were not reached in the Mississippi River except at Hannibal and Louisiana, Mo., where flood stages were exceeded slightly on the 7th and 26th.

The Illinois River was in light to moderate flood beginning on the 6th in the upper portion and continuing into March in the lower portion.

Missouri River basin.—The Grand River exceeded flood stage during two periods, February 6 to 8 and 16 to 17, at Chillicothe, Mo. The highest stage reached at Chillicothe was 24.7 feet on the 6th.

Ohio River basin.—Moderate rises were general over the basin above Pittsburgh on February 8 and 18; however, flood stage was exceeded only at Parkers Landing, Pa., when the Allegheny River became gorged below that point by ice. The maximum stage reached at Parkers Landing was 20.5 feet on the 17th.

Heavy rains occurred generally throughout the Wabash River basin from February 5 to 7, the heaviest amounts occurring in the middle upper section of the Wabash River and the upper portion of the West Fork of the White River. The rainfall, averaging between 2 and 2.5 inches over the entire basin, resulted in moderate flooding from February 6 to 23. The losses have been estimated at about $32,000.

During the night of February 16–17, unusually heavy rains in the French Broad River basin above Asheville, N. C., produced a rapid rise in the river. The crest stage reached at Asheville was 6.1 feet at 9:30 a. m. on the 17th, 0.1 foot above flood stage. Flood stage was not reached at stations below Asheville.

Lower Mississippi River basin.—Slight overflows in the St. Francis River resulted from several periods of rainfall, the first of which occurred on January 26–27, followed by rains at intervals until February 10. No material damage was reported.

Pacific Slope drainage.—On February 4, a mild flood occurred in the Eel River, reaching a crest stage of 19.4 feet at Fernbridge, Calif. This was followed by another flood on the 6th which was the most severe since the great flood of February 1940 and reached a stage of 21.6 feet at Fernbridge. The flood caused many wash-outs along the highways and railroads; the estimated value of tangible property partially destroyed has been set at $22,000.

Light flooding in the Long Tom and Luckiamute Rivers in Oregon during the month caused little or no damage.

A flood, rated as the third most serious flood of recent years in the Sacramento River, occurred during the month. The following account of the flood was submitted by R. K. Linsley, of the Sacramento Weather Bureau office:

Technically the flood of February 1942 presents a very interesting case study, especially in comparison with the floods of December 1937 and February–March 1940. A general comparison of the rainfall in these three floods is presented in table 1. Table 2 shows the comparison between initial stages, crests, and net crest rises. The initial stage is taken as the stage at the station at the beginning of the storm series. The net crest rise is determined by prolonging the recession of the preceding storm at each station in order to determine the stage which would have occurred at the time of the flood crest if no rain had fallen. Subtracting this stage from the actual crest gives the net crest rise for the flood being studied.

TABLE 1.—*Comparative rainfall (inches)*

Station	February 1942						Total	Jan. 22–Feb. 6 total	Feb.–March 1940 total	Dec.–1937 total
	1	2	3	4	5	6				
Sacramento River										
Kennett	0.88	3.66	1.07	3.42	0.98	2.78	12.79	24.87	14.95	12.45
Redding	1.34	.33	1.09	3.07	2.84	.61	9.28	14.55	9.21	8.15
Kilarc	.23	1.05	.05	.65	1.25	2.35	5.58	12.77	6.47	.....
Beegum	.50	1.05	.28	.94	.43	1.51	4.71	7.77	4.92	5.36
Red Bluff	.03	1.17	.28	.20	.16	2.27	4.11	8.66	4.21	4.64
Paskenta	.05	1.91	.05	.55	.47	1.57	4.60	8.20	5.14	.....
Hamilton City	.02	1.62	.17	.59	.15	2.28	4.83	8.51	3.67	4.97
Stonyford	.....	1.63	.....	.65	.58	1.58	4.44	8.74	6.13	5.62
Colusa	T	.75	.75	.49	.47	1.40	3.86	7.64	3.53	3.67
Sacramento	.14	.19	.16	1.03	.88	.39	2.79	7.09	5.63	3.96
Feather River										
Stirling City	(*)	2.69	1.57	2.33	1.25	6.23	14.07	26.60	20.49	.....
Downieville	0.02	1.28	2.12	1.42	.96	5.65	11.45	23.59	17.35	.....
Oroville	.....	.90	0.20	1.04	.65	2.20	4.99	10.08	5.63	6.62
Brush Creek	.10	2.20	1.36	2.50	1.50	6.35	14.01	27.04	16.69	18.92
Challenge	T	1.56	1.34	2.25	1.65	5.80	12.60	23.70	14.72	16.42
Nevada City	T	1.22	1.20	2.07	1.42	3.95	9.86	19.27	12.51	9.84
Marysville	T	.59	.13	1.04	.90	1.87	4.53	7.37	4.09	2.92
American River										
Georgetown	.....	0.50	1.20	1.10	1.60	2.00	6.40	16.46	11.04	7.65
Colfax	.....	.60	1.12	1.11	1.67	2.92	7.42	16.04	9.95	9.97
Folsom	.....	.52	.39	.55	.90	.79	3.15	8.54	5.62	2.95
Putah Creek										
Middletown	.05	1.77	1.12	2.29	.76	5.28	11.27	19.85	12.98	.....

(*) Included in next following measurement.

Unquestionably the flood of February and March 1940 was the most serious flood of recent years in the Sacramento Valley, with the flood of December 1937 a close second, and the recent flood in third place. All three may well be classified as major floods, yet all three were of distinctly different types and in no case were the attendant conditions as serious as they might well have been.

The flood of December 1937 was a true flash flood, resulting from torrential rains extending to high elevations and occurring in about 48 hours. Unusual rains in November of that year had left run-off conditions much better than normal for early December but even so the conditions were not at all favorable for high run-off and it is safe to say that more than half of the rainfall never contributed to storm run-off. Low stages prevailing in the lower reaches of the Sacramento River provided considerable channel storage volume to cushion the sudden rise. Most of the smaller streams in the valley reached their highest crests of record during this flood and a large share of the damage resulted from overflow of these creeks.

The rainfall of February 22 to 29, 1940, was, on the average, somewhat less than that of the December 1937 storm. It occurred over a period of 7 days although the major portion of the rain fell in a 2-day period. Run-off conditions were much more favorable than they had been prior to December 10, 1937, and the stages in the lower Sacramento River were much higher. A flood of extremely serious proportions developed, resulting in numerous levee breaks. These breaks reduced the crests along the lower Sacramento River appreciably, disguising to some extent the magnitude of the flood. This flood may be said to have occurred with "normal" antecedent conditions.

TABLE 2.—*Comparative river stages (feet)*

Station	1942			1940			1937		
	Initial Stage	Crest	Crest Rise	Initial Stage	Crest	Crest Rise	Initial Stage	Crest	Crest Rise
Sacramento River									
Kennett	8.3	20.9	17.4	3.5	36.3	33.8	0.6	29.0	28.5
Red Bluff	13.2	28.6	18.6	7.2	32.2	26.4	3.4	32.0	29.0
Hamilton City	9.6	21.8	14.8	5.4	22.6	18.2	3.2	22.8	19.3
Colusa	22.4	28.6	9.0	14.3	29.5	18.6	3.7	26.8	23.1
Knights Landing	29.6	34.0	6.0	26.0	34.0	11.3	14.0	32.6	18.9
Fremont Weir	1.7	6.2	6.2	0	5.9	5.9	0	5.0	5.0
Sacramento	22.4	27.6	6.9	19.0	28.5	10.3	6.2	27.7	21.5
Stony Creek									
St. John	3.9	[1] 9.5	6.3	2.4	13.9	11.9	.6	12.0	11.4
Feather River									
Oroville	6.6	20.0	15.0	2.3	25.1	23.3	1.7	26.3	24.6
Marysville	56.0	70.0	16.4	52.0	75.5	24.7	49.9	76.2	26.3
Nicolaus	15.2	25.1	13.9	7.7	26.3	20.6	.9	24.6	23.7
Yuba River									
Colgate	[2] 4.3	[2] 13.3	[2] 9.8	2.2	14.8	12.8	.1	22.0	21.9
Bear River									
Wolf	3.2	9.0	6.6	.....	.....	.....	[2] .5	[1] 10.3	[2] 9.8
American River									
Folsom	7.2	14.7	8.9	4.1	19.1	16.3	2.0	23.9	21.9

[1] From floodmarks.
[2] Estimated.

The floods of late January 1942 were followed by a period of intermittent showers extending until about February 1. At this time run-off conditions were exceptionally favorable and stages throughout the Sacramento Valley were rather high. From February 1 to 4 a succession of frontal passages brought intervals of moderate rain to the lower elevations of the entire Sacramento Valley, and by February 5 all main river stations were near or above flood stage.

During the afternoon and early evening of February 5, a small storm passed inland in the vicinity of the Golden Gate and moved northeastward bringing heavy rain at low levels in the valley. Only moderately heavy rain occurred in the foothills and lower mountains to the east of the main river and snow fell above on elevation of about 4,000 feet in all parts of the valley. Rainfall to the west of the river was comparatively light. Moderate rises developed in the tributary streams on the western side of the valley and in the headwater areas of the eastern tributaries. The heavy rain falling on the valley floor during a period of about 12 hours caused a sharp, high peak of local run-off, although the total volume of run-off was not excessive. This local run-off combining with the moderate flows from the tributary streams draining the higher areas, arrived in a river channel already swollen with run-off from the previous rains. Critical stages occurred from Red Bluff to the mouth of the Feather River.

Only light rain and snow fell in the American River Basin on February 5 and 6 and no important stages were reached. With 11 gates at the Sacramento Weir open throughout the entire storm and with only moderate flows from the American River, no danger threatened in the vicinity of Sacramento at any time. The streams of the Feather River system likewise reflected the effect of snowfall at low elevations, and stages at all stations were well below previous records. This flood on the Feather River falls in about seventh place among the floods of the last 40 years. The crest of 9.5 feet at St. John on Stony Creek likewise falls into seventh place for the same period.

Rainfall in the San Joaquin Valley was very light. Moderate rises developed on the Cosumnes and Mokelumne Rivers. Stages in other streams of the San Joaquin system reflected only inconsequential run-off.

The recent flood was not, therefore, the result of any spectacular meteorological occurrences, but rather it was caused by the fortuitous occurrence of successive moderate rains, each storm so timed that the stages were gradually built up over a 5-day period to the point where a sudden intense burst of rain was sufficient to cause near record crests at several main river stations. The lower Sacramento River system with its bypasses and overflow basins is in reality a huge detention reservoir and is susceptible to floods caused by the gradual accumulation of water in this basin, as has been demonstrated in the recent flood. It is fortunate that the rains did not extend to higher elevations, for any further increase in flow from the tributary streams would have caused a record flood throughout the valley.

Table 3 summarizes the damage resulting from the flood of February 1942, indicating also the value of the Weather Bureau's flood-warning service. These figures were, for the most part, collected from county authorities in the areas subjected to flooding. Specific estimates from some of the larger ranches, public utility companies, and state agencies are included. Because of the difficulty of estimating potential farm damage and cost of rehabilitation at this early date, these figures represent the best data now at hand but some revision may be indicated when further information becomes available.

TABLE 3.—*Flood loss statistics*

Actual damage to buildings, furnishings, land, merchandise, and equipment	$284,500
Actual damage to roads, bridges, levees, irrigation and drainage works	811,200
Value of livestock lost	13,000
Damage to crops, actual and prospective	688,380
Cost of emergency protection, evacuation and relief	20,000
Loss of income and suspension of business including wages of employees	23,500
Total loss	1,840,580
Money value of property saved by reason of flood warnings issued by the U. S. Weather Bureau	92,500

Number of lives lost as a direct result of the flood, 1.

Although critical stages brought a major threat to nearly all levees in the valley, vigilant patrol prevented serious failures in nearly all cases. In several instances actual breaks were repaired in time to prevent flooding of the protected area. A report prepared by the State department of public works lists 14 places at which levee damage was important enough to warrant extensive repairs as a protection against further floods during the remainder of the season.

Sutter County, undoubtedly, suffered the heaviest damage from the flood. A break in the levee of the Feather River near the junction with Sutter Bypass permitted the inundation of some 32,000 acres of land in reclamation districts 803 and 823 and levee district 1. Approximately 300 homes were flooded, but fortunately there was sufficient time to evacuate all residents, livestock and a large portion of the movable equipment and furnishings. Orchards head the list of damages with 3,160 acres flooded. A portion of this year's crop will undoubtedly be lost. In addition, protracted flooding of the orchards will certainly result in the death of many peach trees from sour sap, but it will be several months before any exact inventory of this loss can be made. Some 24,500 acres of grain and forage crops were also flooded.

Butte County likewise suffered considerable damage in the Butte Basin area. Since this area is subject to periodic overflow and has no protection the losses were not so serious as those in Sutter County. Damage was confined largely to roads, fences and planted crops.

Considerable flooding occurred in the lowlands of Tehama and Glenn Counties but relatively little damage was done. Nearly all livestock and equipment was removed as soon as the Weather Bureau's warnings were issued. An abutment of a concrete bridge on the Corning-Vina Road was undermined and other roads and culverts suffered some damage.

Seepage water, local drainage and the overflow of some tributary creeks caused inconvenience and some slight damage in Colusa and Yolo Counties. Minor overflows occurred in the lower reaches of Cache and Putah Creeks and in the vicinity of the Colusa trough. Damage was limited mostly to erosion and washing of planted fields since the duration of overflow was very short.

The tidal reclamation districts located in the lower Yolo Bypass suffered heavily. Hastings, Egbert, Prospect, Liberty Farms and Little Holland tracts were all flooded. These tracts are protected by substandard levees and with the exception of the Hastings tract the levees were all overtopped. The levees of both upper and lower Hastings tract were breached. Fortunately the break in the lower Hastings tract levee was repaired before any important flooding occurred.

At the peak of the flood at least 13 major highways were closed by floodwaters at one or more spots. Some railroad branch lines were also flooded, but no closure of main-line railroad trackage was reported. The closing of these roads combined with the blockading of roads by snow or landslides caused considerable inconvenience.

Estimated losses and savings from floods during February 1942

River and drainage	Tangible property	Matured crops	Prospective crops	Livestock and other movable farm property	Suspension of business	Total losses	Total savings
ATLANTIC SLOPE							
Broad River			$1,700			$1,700	$700
Savannah River					$2,500	2,500	5,000
East Gulf of Mexico							
Black Warrior-Tombigbee	$1,200				1,000	2,200	
Ohio River Basin							
Wabash River	2,100	$500	15,500	$6,000	7,600	31,700	19,100
PACIFIC SLOPE							
Eel River	22,000					22,000	4,000
Sacramento River	1,115,700		688,380	13,000	23,500	1,840,580	92,500

FLOOD-STAGE REPORT, FEBRUARY 1942

[All dates in February unless otherwise specified]

River and station	Flood stage	Above flood stages—dates From—	Above flood stages—dates To—	Crest Stage	Crest Date
ST. LAWRENCE DRAINAGE					
Lake Erie					
Maumee: Fort Wayne, Ind	*Feet* 15	6	7	*Feet* 15.7	7
ATLANTIC SLOPE DRAINAGE					
Neuse: Smithfield, N. C	13	18	20	14.2	19
Cape Fear: Lock No. 2, Elizabethtown, N. C	20	18	21	23.6	19
Saluda: Pelzer, S. C	6	16	19	11.0	18
Broad: Blairs, S. C	14	17	20	21.5	19
Catawba: Catawba, S. C	11	18	18	11.7	18
Santee: Rimini, S. C	12	19	(1)	15.8	23
Savannah:					
Butler Creek, Ga	21	18	20	23.3	19
Clyo, Ga	11	23	(1)	16.2	27
Ogeechee: Dover, Ga	7	22	(1)	7.7	28
Ocmulgee: Abbeville, Ga	11	23	26	11.5	25
Oconee: Milledgeville, Ga	20	18	18	20.9	18
Altamaha: Charlotte, Ga	12	21	(1)	15.3	27
EAST GULF OF MEXICO DRAINAGE					
Apalachicola: Blountstown, Fla	15	18	(1)	19.2	22, 24
Oostanaula:					
Resaca, Ga	22	18	19	22.8	19
Rome, Ga	25	18	19	25.6	18
Etowah:					
Canton, Ga	17	17	18	22.0	18
Cartersville, Ga	18	17	19	22.0	18, 19
Coosa:					
Mayos Bar Lock, Ga	28	18	19	28.6	19
Gadsden, Ala	20	18	22	22.4	19
Lock No. 4, Lincoln, Ala	17	18	19	17.4	19
Black Warrior:					
Lock No. 10, Tuscaloosa, Ala	47	17	19	53.5	17
Lock No. 7, Ala	35	18	23	41.8	21
Tombigbee:					
Lock No. 4, Demopolis, Ala	39	19	25	44.4	22
Lock No. 3, Ala	33	18	(1)	45.4	22, 23
Lock No. 2, Ala	46	22	25	46.8	23, 24
Lock No. 1, Ala	31	22	(1)	33.2	26
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Illinois:					
Morris, Ill	13	6	11	21.6	6
Peru, Ill	17	7	21	23.2	8
Peoria, Ill	18	9	22	20.6	12, 13
Havana, Ill	14	8	(1)	18.7	19
Beardstown, Ill	14	7	(1)	20.8	17, 18
Mississippi:					
Hannibal, Mo	13	7	7	13.2	7
		24	26	13.5	26
Louisiana, Mo	12	4	6	12.5	5
		6	8	12.6	7, 8

FLOOD-STAGE REPORT, FEBRUARY 1942—Continued

River and station	Flood stage	Above flood stages—dates From—	Above flood stages—dates To—	Crest Stage	Crest Date
MISSISSIPPI SYSTEM—continued					
Missouri Basin	*Feet*			*Feet*	
Grand: Chillicothe, Mo	18	6	8	24.7	6
		16	17	23.4	16
Ohio Basin					
Allegheny: Parkers Landing, Pa	20	17	17	20.5	17
West Fork of White:					
Anderson, Ind	10	7	8	10.8	8
		18	18	10.0	18
Elliston, Ind	18	7	12	23.3	10
		18	20	19.5	19
Edwardsport, Ind	12	6	15	20.0	12
		17	23	17.6	21
East Fork of White: Seymour, Ind	14	8	10	14.7	9
		18	18	14.1	18
White:					
Petersburg, Ind	16	10	15	18.6	14
		20	23	17.1	22
Hazleton, Ind	16	11	17	18.9	18
		20	24	17.7	23
Wabash:					
Wabash, Ind	12	6	9	15.6	7
		17	18	12.4	17
La Fayette, Ind	11	6	11	19.0	8
		17	19	13.8	18
Covington, Ind	16	7	13	22.2	10
		19	20	16.9	19
Terre Haute, Ind	14	6	15	18.5	11
		18	21	14.4	19, 21
Vincennes, Ind	14	12	19	16.3	16
Mount Carmel, Ill	17	13	23	19.3	16
New Harmony, Ind	15	17	19	15.1	18
French Broad: Asheville, N. C	6	17	17	6.1	17
White Basin					
Black: Poplar Bluff, Mo	14	2	3	16.1	2
Arkansas Basin					
North Canadian: Yukon, Okla	8	(2)	26	9.4	16, 17, 18
Red Basin					
Sulphur: Ringo Crossing, Tex	20	(2)	2	[3] 22.0	1
		17	19	[3] 23.5	18
Lower Mississippi Basin					
Big Lake Outlet: Manila, Ark	10	4	(1)	12.0	Feb. 28–March 2
St. Francis:					
Fisk, Mo	20	2	10	21.1	4
St. Francis, Ark	18	7	21	19.6	18
Coldwater: Coldwater, Miss	13	6	12	14.9	1
		17	20	13.6	19
		24	(1)	15.3	25
PACIFIC SLOPE DRAINAGE					
San Joaquin Basin					
Mokelumne: Bensons Ferry, Calif	12	8	8	12.1	8
Sacramento Basin					
Feather: Nicolaus, Calif	25	7	8	25.1	8
Sacramento:					
Red Bluff, Calif	23	4	7	28.6	6
Hamilton, Calif	20	6	7	21.8	6
Colusa, Calif	28	7	8	28.6	8
Knights Landing, Calif	30	(2)	1	31.5	Jan. 28
		4	13	34.0	8
Eel Basin					
Eel: Fernbridge, Calif	17.5	4	5	19.4	4
		6	7	21.6	6
Columbia Basin					
Long Tom: Monroe, Oreg	10	1	1	10.2	1
		4	6	10.5	5
		9	11	10.3	10
		12	15	10.5	14
Luckiamute: Suver, Oreg	25	5	6	26.7	5

[1] Continued into following month.
[2] Continued from preceding month.
[3] Estimated.

CLIMATOLOGICAL DATA

CONDENSED CLIMATOLOGICAL SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS

[For description of tables and charts, see REVIEW, January 1941, p. 32]

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Section	Temperature							Precipitation					
			Monthly extremes							Greatest monthly		Least monthly	
	Section average	Departure from the normal	Station	Highest	Date	Station	Lowest	Date	Section average	Departure from the normal	Station	Amount	Station	Amount
	°F.	°F.		°F.			°F.		In.	In.		In.		In.
Alabama	44.9	−4.0	Andalusia	79	6	Huntsville	11	19	4.73	−0.48	Robertsdale	8.80	Samantha	2.47
Arizona	41.4	−4.6	Nogales	84	7	Alpine	−15	18	1.08	−.28	Bright Angel	3.94	Parker	.02
Arkansas	41.2	−2.3	Camden	81	6	Gravette	−2	[1] 18	2.97	−.44	Clarendon	5.63	Waldron	1.16
California	45.4	−2.6	Indio	81	4	Ellery Lake	−18	25	3.80	−.80	Upper Mattole	16.90	2 stations	.00
Colorado	21.0	−6.1	Eads	68	7	Taylor Park	−52	18	1.13	+.14	Wolf Creek Pass	5.50	Bloom	T
Florida	55.1	−5.4	Loxahatchee	91	18	2 stations	20	[1] 2	4.55	+1.36	Pensacola	12.16	Key West Airport	1.44
Georgia	43.7	−4.8	Fargo	78	16	Blairsville	8	3	4.53	−.34	Jasper	8.52	Goat Rock	3.23
Idaho	23.8	−4.2	Cambridge	59	1	Island Park Dam	−47	18	1.60	−.16	Deception Creek	4.53	Challis	.23
Illinois	28.6	−1.2	Harrisburg	65	5	2 stations	−4	[1] 2	3.21	+1.27	Shawneetown	5.86	Galena	.47
Indiana	28.3	−2.2	Tell City	68	5	Goshen	−6	20	3.40	+.97	Veedersburg	4.97	Albion	1.49
Iowa	23.4	+1.1	Thurman	52	4	Decorah	−21	20	1.15	+.06	Keokuk	3.38	Inwood	.40
Kansas	32.3	−.7	Independence	72	5	Syracuse	−17	18	1.17	+.17	Bethel (near)	3.13	2 stations	.27
Kentucky	34.1	−2.9	Leitchfield	67	6	Mammoth Cave	2	19	2.62	−.77	Hopkinsville	3.98	Paintsville	1.32
Louisiana	50.1	−3.6	2 stations	80	6	Urania	20	22	5.27	+.69	Belle Chasse	13.52	Coushatta	1.32
Maryland-Delaware	32.0	−1.2	Pocomoke City, Md	66	17	Oakland, Md	−9	3	2.13	−.88	Newark, Del	3.21	Crisfield, Md	.97
Michigan	19.7	−.5	2 stations	44	[1] 5	Kenton	−31	19	1.00	−.70	Monroe	2.80	Kenton	.14
Minnesota	16.4	+3.9	Beardsley	50	5	2 stations	−38	[1] 18	.30	−.44	Pigeon River Bridge	1.57	Madison	T
Mississippi	45.4	−3.9	Leakesville	80	6	Rochdale	14	19	4.27	−.61	Pearlington	11.61	Yazoo City	2.06
Missouri	31.0	−.1	Mount Vernon	74	5	Neosho	−10	18	3.00	+.93	Elsberry	5.61	Van Buren	1.24
Montana	20.0	−2.1	3 stations	54	[1] 2	West Yellowstone	−47	18	.69	−.08	King's Hill	2.37	Lothair	T
Nebraska	25.0	−1.2	Culbertson	67	4	Harrison	−18	17	.95	+.25	Howells	2.90	Sheep Creek Camp No. 5	.12
Nevada	32.1	−1.9	Desert Game Range	83	4	San Jacinto	−26	18	.84	−.24	Marlette Lake	8.76	3 stations	T
New England	21.6	−1.0	New Haven, Conn	54	17	Enosburg Falls, Vt	−37	3	2.68	−.42	Gloucester, Mass	4.69	Bethlehem, N. H	.77
New Jersey	29.7	−.9	Hammonton	63	1	Runyon	−5	3	2.69	−.86	Chatham	4.62	Layton	.92
New Mexico	34.0	−3.2	2 stations	79	[1] 2	Selsor Ranch	−37	18	.54	−.19	Ecks' Ranch	2.04	Loving	.00
New York	20.5	−1.9	Patchogue	54	17	2 stations	−28	3	2.42	−.27	Eden	4.64	Albany	.95
North Carolina	37.8	−4.8	Willard	72	17	do	−5	[1] 2	3.63	−.40	Rock House	7.37	2 stations	1.56
North Dakota	14.1	+4.4	Dickinson	57	4	4 stations	−30	17	.36	−.11	2 stations	1.00	McVille	T
Ohio	26.9	−2.4	Gallipolis (near)	60	6	2 stations	−7	3	2.66	+.05	Sidney	4.50	Lock No. 23	1.58
Oklahoma	40.8	−.2	Tipton	85	5	Kenton	−8	18	1.40	−.02	Poteau	2.81	Goodwell	.20
Oregon	34.0	−1.3	Powers	66	18	Seneca	−29	19	3.19	−.01	Headworks	13.01	Redmond	.66
Pennsylvania	25.8	−2.6	3 stations	58	[1] 16	Kane	−21	3	2.64	−.21	Lycippus	4.60	Claysville	1.01
South Carolina	41.9	−5.5	Ridgeland	73	6	Longcreek (near)	9	21	3.90	−.32	Caesars Head	7.82	Rimini	1.23
South Dakota	21.2	+2.1	Faith	58	[1] 4	Camp Crook	−30	24	.53	−.03	Geddes	2.19	Ipswich	T
Tennessee	37.3	−3.8	Moscow	69	5	Rugby	5	[1] 19	4.02	−.34	Monteagle	6.16	Tri-City Airport	2.03
Texas	49.1	−2.2	Laredo	92	5	2 stations	−5	18	1.27	−.51	Galveston	7.05	2 stations	.00
Utah	24.3	−5.6	St. George	66	3	Woodruff	−43	18	1.30	.00	Alta	5.80	Linwood	.00
Virginia	34.3	−2.8	Culpeper	68	17	Mountain Lake	−6	3	1.82	−1.24	Pinnacles	3.44	Moore's Creek Dam	.22
Washington	36.1	+2.0	Wawawai	62	15	Newport	−9	23	2.77	−1.02	Naselle	12.69	Clarkston Heights	.33
West Virginia	29.3	−4.0	2 stations	66	[1] 15	Alpena	−14	3	2.22	−.90	Pickens No. 2	4.97	McNeill	.81
Wisconsin	18.8	+1.7	do	46	[1] 15	Rest Lake	−39	19	.55	−.64	Prentice (near)	1.38	Ashland (near)	.13
Wyoming	16.9	−5.2	3 stations	60	3	Afton (near)	−48	18	.64	−.14	Bechler River	6.65	Powell	T
Alaska [January]	16.3	+13.7	Radioville	60	23	Fort Yukon	−45	31	2.95	+.77	Little Port Walter	44.05	Crooked Creek	T
Hawaii [January]	69.2	+.6	Kaneohe (Mauka)	88	25	Kanalohuluhulu	34	[1] 3	2.24	−6.23	Honomalle (Mauka)	13.05	4 stations	.00
Puerto Rico	74.0	+1.2	Quebradillas	96	[1] 24	3 stations	50	[1] 7	2.91	−.43	La Mina (El Yunque)	14.39	Potala	.00
Hawaii	69.7	+.8	Pahala (Hawaii)	88	20	Volcano Observatory	42	13	6.77	−.88	Kukui	38.00	Niu Ridge	.00

[1] Other dates also.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch, or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Thunderstorms
	Ft.	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	°F.	%	*In.*	*In.*		*Miles*								*0-10*	*In.*	*In.*	
New England				**22.2**	**−1.4**													**70**	**2.48**	**−0.8**										**5.6**			
Eastport	75	67	85	29.57	29.66	−0.32	21.3	−0.2	40	1	27	−1	4	16	21	20	17	83	1.29	−2.1	13	13.0	nw.	38	e.	7	7	9	12	6.1	10.9	2.0	0
Greenville, Maine	1,070	6	41	28.52	29.73	.....	12.5	−.8	36	28	23	−20	5	2	45	12	9	...	2.71	.....	13	.....	nw.	...	...	...	4	7	17	...	22.3	34.2	0
Portland, Maine [1]	103	5	36	29.61	29.73	−.29	22.1	.....	41	28	31	−2	13	13	30	18	13	73	3.92	−.1	11	9.7	nw.	34	ne.	7	13	5	10	4.7	16.2	3.0	0
Concord [2]	289	54	72	29.45	29.77	−.27	21.0	−1.8	44	17	30	−5	3	12	30	17	11	66	1.81	−1.1	10	11.6	nw.	37	nw.	13	12	6	10	4.9	10.5	3.5	0
Burlington [2]	403	11	48	29.39	29.85	−.18	16.5	−2.9	42	17	24	−17	4	9	32	14	10	80	1.45	−.1	18	8.6	nw.	24	s.	16	6	4	18	7.3	18.2	2.7	0
Northfield	876	12	60	28.83	29.82	−.22	15.3	−1.1	47	17	24	−24	4	6	42	.....	...	...	1.55	−.7	15	8.2	n.	27	ne.	9	6	5	17	7.1	18.1	7.6	0
Boston [1]	124	33	62	29.62	29.76	−.28	27.0	.....	48	17	34	1	3	20	22	23	14	60	3.45	+.1	7	14.6	nw.	33	nw.	13	9	10	9	5.2	6.2	.0	0
Nantucket	12	10	63	29.73	29.77	−.29	28.6	−2.1	48	17	35	11	3	23	18	23	20	72	2.74	−.6	9	12.2	nw.	35	e.	7	10	10	8	5.1	3.6	.0	0
Block Island	26	11	46	29.75	29.78	−.28	28.3	−2.1	49	17	35	7	3	22	22	25	18	66	2.52	−1.1	6	21.6	nw.	52	nw.	21	13	8	7	4.1	2.2	.0	0
Providence [2]	159	46	60	29.60	29.79	−.26	28.1	−.9	51	17	36	4	3	20	23	22	16	67	3.84	+.2	7	11.0	nw.	29	nw.	21	8	10	10	5.8	8.1	.0	0
Hartford [1]	159	5	44	29.64	29.82	−.24	26.2	.....	47	17	34	2	3	18	25	22	15	65	2.11	−1.7	9	12.1	n.	34	nw.	13	6	9	13	6.1	5.7	.0	0
New Haven [1]	107	74	153	29.71	29.84	−.23	27.9	−1.1	54	17	36	2	3	20	24	24	19	73	2.58	−1.4	5	11.1	nw.	28	ne.	7	13	7	8	4.9	4.1	.0	0
Middle Atlantic States							**31.4**	**−2.0**										**62**	**2.13**	**−1.0**										**5.6**			
Albany [1]	97	26	40	29.76	29.86	−.21	20.8	−.6	42	17	28	−5	3	14	24	18	11	67	.95	−1.5	8	13.6	nw.	40	w.	13	6	7	15	6.6	7.0	T	0
Binghamton	871	57	79	28.93	29.91	−.17	22.2	−1.8	46	17	29	−5	3	15	25	20	16	81	2.07	−.2	21	7.7	w.	20	w.	21	2	4	22	8.4	14.9	T	0
New York	314	415	454	29.50	29.85	−.23	29.6	−1.7	53	17	37	5	3	22	20	25	15	50	2.94	−.9	8	22.0	nw.	58	nw.	21	12	6	10	5.3	1.2	.0	0
Harrisburg [1]	374	30	49	29.52	29.93	−.16	29.8	.....	49	17	37	7	3	23	22	25	17	60	2.93	.0	5	12.4	nw.	31	nw.	21	8	8	12	5.8	4.9	.0	0
Philadelphia [2]	114	174	367	29.78	29.90	−.20	31.7	−2.2	55	17	39	10	3	25	20	26	18	63	2.30	−1.0	6	15.2	nw.	39	ne.	7	9	11	8	5.3	2.0	.0	0
Reading	323	47	306	29.55	29.91	.....	30.0	−.5	49	17	37	8	3	23	22	.....	...	...	2.40	−1.0	5	17.5	nw.	46	e.	7	10	6	12	5.8	2.7	.0	0
Scranton	805	72	104	29.00	29.89	−.19	24.1	−3.2	45	16	30	1	3	18	22	.....	...	...	1.25	−1.8	8	8.7	nw.	29	nw.	8	5	8	15	7.1	4.8	.0	0
Atlantic City	52	37	172	29.83	29.89	−.22	32.2	−1.4	58	17	40	10	3	25	22	27	18	59	2.22	−1.1	5	18.2	w.	54	ne.	7	12	9	7	4.7	T	.0	0
Trenton	190	89	107	29.67	29.88	.....	30.2	−.5	53	17	37	9	3	23	20	26	17	59	2.08	−1.2	5	12.3	nw.	34	ne.	7	11	8	9	5.3	.4	.0	0
Baltimore [2]	123	100	215	29.80	29.93	−.18	34.4	−1.0	56	17	42	12	3	27	19	28	19	58	2.79	−.6	5	13.4	nw.	46	sw.	1	12	5	11	4.9	1.0	.0	0
Washington [1]	112	62	85	29.82	29.95	−.16	34.2	−1.1	59	15	42	12	3	27	29	28	19	56	2.03	−1.2	5	10.7	nw.	27	nw.	8	13	7	8	4.6	.1	.0	0
Cape Henry	18	8	54	29.91	29.93	.....	37.6	−3.6	67	17	44	18	4	32	27	33	27	66	2.12	−1.1	4	15.0	nw.	37	n.	25	13	6	9	5.0	T	.0	0
Lynchburg	681	144	184	29.22	29.99	−.12	36.9	−3.4	60	17	46	16	4	28	36	30	20	53	2.08	−1.1	6	9.5	nw.	28	nw.	8	11	4	13	5.6	.4	.0	0
Norfolk [2]	91	80	125	29.85	29.95	−.16	38.8	−3.9	66	17	46	16	3	31	23	32	25	64	2.63	−.6	4	11.1	nw.	27	s.	17	12	3	13	5.5	T	.0	0
Richmond [2]	144	11	52	29.79	29.95	−.16	36.8	−2.8	65	17	46	12	3	27	33	28	20	62	1.11	−2.1	5	9.3	nw.	26	sw.	17	12	7	9	4.8	T	.0	0
South Atlantic States							**42.9**	**−5.3**										**70**	**3.69**	**−0.3**										**5.5**			
Asheville	2,253	89	104	27.60	30.03	−.10	33.5	−5.0	59	5	41	10	3	26	31	29	23	71	3.49	+.3	8	10.8	nw.	30	nw.	7	9	6	13	5.9	5.9	.7	1
Charlotte [2]	779	63	86	29.13	29.98	−.14	40.2	−3.7	64	16	49	18	3	32	28	33	26	67	4.91	+.7	8	7.3	nw.	24	sw.	6	10	7	11	5.2	8.1	.0	1
Greensboro [1]	886	6	56	29.03	30.00	.....	36.5	.....	62	16	46	13	3	27	39	31	24	64	3.53	.....	7	9.2	nw.	29	s.	16	9	6	13	5.8	3.7	T	0
Hatteras	11	5	50	29.94	29.95	−.16	41.6	−5.8	68	17	47	23	3	36	21	38	36	82	2.76	−1.3	8	15.5	n.	42	n.	24	10	8	10	5.2	T	.0	1
Raleigh [1]	376	27	69	29.57	29.98	−.13	39.2	−3.0	66	17	49	17	3	29	35	32	24	60	2.51	−1.4	7	10.6	nw.	39	s.	17	10	7	11	5.6	T	.0	1
Wilmington	72	73	107	29.91	29.99	−.13	42.0	−5.9	70	17	50	22	3	34	27	37	30	68	3.97	+.7	8	9.8	nw.	32	sw.	17	8	8	12	5.8	8.0	T	1
Charleston [2]	48	11	92	29.95	30.00	−.12	45.2	−7.2	66	17	52	26	3	38	21	39	35	79	2.94	.0	8	10.1	nw.	33	s.	6	8	7	13	6.2	T	.0	1
Columbia, S. C. [2]	347	70	91	29.62	30.00	−.11	43.6	−4.6	68	16	53	21	3	34	32	37	32	74	2.94	−.8	7	8.1	nw.	25	s.	16	12	5	11	5.2	T	.0	1
Greenville, S. C. [1]	1,040	70	78	28.87	30.00	.....	39.7	.....	63	16	49	18	3	31	31	33	27	68	5.04	−.1	8	9.1	n.	32	w.	16	15	2	11	5.0	.8	.0	2
Augusta [2]	182	62	77	29.81	30.00	−.12	44.6	−5.3	72	16	54	24	3	36	31	37	30	64	3.85	−.3	8	6.1	nw.	22	sc.	6	10	7	11	5.5	T	.0	1
Savannah [2]	65	73	132	29.95	30.02	−.10	48.0	−6.0	70	16	57	28	3	39	27	40	35	71	3.44	+.3	8	10.5	nw.	39	nw.	6	10	5	13	5.6	.0	.0	1
Jacksonville [2]	43	86	110	29.98	30.03	−.09	51.4	−6.6	79	16	60	31	3	43	25	44	40	76	4.70	−1.7	11	8.3	nw.	27	w.	24	11	5	12	5.3	.0	.0	0
Florida Peninsula							**52.2**	**−4.3**										**79**	**2.58**	**+0.7**										**4.7**			
Key West [2]	21	10	64	29.97	29.99	−.08	66.8	−3.7	84	18	72	51	3	61	20	61	58	80	1.46	+.1	3	11.4	ne.	35	w.	24	14	9	5	4.4	.0	.0	1
Miami [2]	25	124	168	29.97	30.00	−.10	63.2	−3.9	82	11	71	40	3	55	27	54	51	80	2.77	+.9	4	11.8	n.	34	w.	24	10	12	6	4.6	.0	.0	0
Tampa [1]	35	5	61	29.99	30.03	−.07	56.7	−5.2	76	17	65	37	3	49	28	50	47	76	3.52	+1.0	9	11.4	n.	32	nw.	24	10	11	7	5.1	.0	.0	1
East Gulf States							**47.2**	**−5.1**										**72**	**5.69**	**+0.9**										**6.4**			
Atlanta [1]	1,173	5	72	28.76	30.03	−.09	40.3	.....	69	16	48	19	19	32	30	35	23	66	3.84	−1.2	8	12.1	nw.	41	nw.	6	7	7	14	6.6	T	.0	2
Macon [2]	370	79	87	29.63	30.03	−.09	44.3	−5.0	70	16	53	24	3	35	30	38	32	69	4.26	−.2	8	8.3	nw.	28	sw.	6	7	8	13	6.0	.0	.0	2
Thomasville	273	49	58	29.76	30.06	−.06	47.6	−7.4	72	6	58	28	3	37	36	.....	...	...	4.35	−.1	7	.....	...	...	...	...	9	5	14	...	.0	.0	0
Apalachicola	35	11	51	29.99	30.03	.....	51.3	−5.0	69	6	59	34	28	44	21	46	42	76	7.59	+3.7	11	9.4	n.	28	nw.	24	8	7	13	5.8	.0	.0	1
Pensacola	56	54	79	29.99	30.05	−.06	50.0	−5.2	72	6	58	30	28	43	23	45	40	73	12.16	+7.8	9	8.6	n.	28	se.	15	6	8	14	6.6	.0	.0	2
Anniston	741	9	.....	.....	.....	.....	42.4	−3.4	69	16	51	19	19	34	34	.....	...	...	4.15	−1.3	7	.....	nw.	...	...	...	3	11	14	...	T	.0	2
Birmingham [1]	700	11	48	29.30	30.07	−.05	43.2	−4.8	70	16	52	20	19	34	28	36	31	70	3.62	−1.4	8	8.6	n.	30	s.	16	8	4	16	6.5	T	.0	2
Mobile [2]	57	6	30	30.00	30.06	−.05	49.6	−5.1	77	6	58	29	28	41	28	44	39	76	7.32	+2.0	8	10.5	n.	32	s.	16	5	12	11	6.3	T	.0	3
Montgomery [2]	218	92	105	29.82	30.05	−.07	45.7	−5.9	73	6	54	26	19	38	25	40	34	70	3.67	−1.8	9	8.4	n.	30	sw.	6	9	5	14	6.3	T	.0	1
Meridian [2]	375	67	92	29.66	30.07	−.04	45.4	−4.2	74	16	55	23	19	36	32	40	36	76	3.04	−2.4	6	6.8	n.	26	w.	6	9	6	13	6.0	.0	.0	1
Vicksburg [1]	247	82	102	29.79	30.06	−.04	47.0	.....	72	15	55	25	19	39	25	39	34	73	3.82	−1.0	6	9.5	n.	29	sw.	5	6	5	17	6.8	T	.0	2
New Orleans [2]	53	76	84	29.99	30.05	−.04	52.5	−4.8	76	6	60	35	28	46	21	47	42	72	10.41	+6.2	10	7.8	ne.	22	nw.	16	4	9	15	7.0	.0	.0	4
West Gulf States							**49.7**	**−1.8**										**73**	**2.41**	**−0.1**										**7.2**			
Shreveport [1]	249	92	227	29.78	30.06	−.03	47.4	−2.5	72	5	56	27	12	38	30	42	36	71	1.34	−2.0	6	12.1	se	36	nw.	23	6	4	18	7.0	.0	.0	2
Bentonville [1]	1,303	12	51	28.63	30.03	−.07	37.2	−1.3	72	5	47	5	18	28	31	.....	...	...	2.46	+.3	11	8.3	s.	.....	...	...	9	17	2	6.9	3.5	.0	4
Fort Smith	463	57	82	.....	30.03	−.07	41.8	−1.0	73	5	50	15	18	33	.....	.....	...	...	2.26	−.3	9	9.3	e.	39	w.	5	8	8	12	...	.9	.0	6
Little Rock [2]	357	94	102	29.66	30.07	−.04	42.0	−2.9	67	8	50	20	19	34	27	38	34	77	3.52	−.3	9	8.5	se.	30	sw.	4	6	9	13	6.5	.5	.0	3
Austin [2]	605	68	90	29.38	30.03	.....	51.8	−1.6	77	5	61	24	18	43	32	45	40	69	1.46	−.9	10	8.6	n.	34	sw.	16	5	7	16	6.9	.0	.0	0
Brownsville [2]	57	88	96	29.90	29.96	.....	60.4	−2.2	82	23	68	34	19	53	28	56	54	83	1.26	.0	12	11.7	n.	29	n.	16	0	8	20	8.4	.0	.0	0
Corpus Christi [2]	20	11	78	29.98	30.00	−.05	57.9	−.5	80	23	64	34	19	51	24	53	50	82	4.67	+3.2	9	11.1	n.	35	n.	18	3	9	16	7.7	.0	.0	3
Dallas [1]	512	6	46	29.48	30.04	.....	48.4	−.3	86	5	58	20	18	38	31	42	35	65	.96	−1.3	4	12.8	se.	37	w.	5	7	7	14	6.5	.0	.0	2
Fort Worth [1]	679	35	56	29.30	30.03	−.04	48.3	.....	85	5	59	19	18	38	32	42	36	68	.64	−1.1	6	13.2	se.	38	nw.	18	6	12	10	6.1	T	.0	2
Galveston [2]	54	106	114	29.96	30.02	−.05	54.0	−2.3	73	23	59	36	19	50	20	50	47	79	7.05	+4.2	12	11.7	n.	31	nw.	26	4	3	21	8.2	.0	.0	3
Houston [2]	138	157	190	29.88	30.04	.....	53.4	−2.5	76	5	61	33	19	46	25	48	44	76	2.25	−.9	12	11.0	e.	29	se.	22	4	4	20	7.9	.0	.0	2
Palestine	510	64	72	29.51	30.05	−.03	48.6	−2.6	74	5	57	24	18	40	28	43	36	65	.65	−2.4	9	8.9	n.	25	nw.	23	4	10	14	6.9	T	.0	0
Port Arthur	34	59	134	30.00	30.03	.....	53.1	.....	77	23	60	33	19	46	26	48	44	76	3.22	−.3	11	14.5	n.	36	se.	14	3	9	16	7.3	.0	.0	3
San Antonio [1]	693	28	59	29.28	30.02	−.03	53.8	−1.6	81	5	64	30	20	44	37	47	41	69	2.01	+.4	11	8.9	ne.	30	nw.	23	4	4	20	7.8	.0	.0	1

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch, or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Thunderstorms
Ohio Valley and Tennessee	*Ft.*	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	°F.	%	*In.*	*In.*		*Miles*								*0–10*	*In.*	*In.*	
							30.8	**−3.8**										**77**	**2.95**	**−0.3**										**7.3**			
Chattanooga [1]	762	21	54	29.22	30.06	−.07	37.6	.....	60	16	47	15	20	29	37	33	28	73	4.07	.....	7	7.8	nw.	35	w.	6	7	3	18	7.1	.5	.0	2
Knoxville [2]	995	66	84	28.96	30.05	−.07	36.1	−5.8	59	14	45	13	19	27	33	31	26	71	3.72	−.8	9	7.1	ne.	42	sw.	6	5	7	16	7.0	8.7	T	1
Memphis [2]	399	78	86	29.62	30.06	−.05	40.0	−4.3	64	5	48	19	19	32	29	36	33	78	4.22	−.1	9	8.5	nw.	28	w.	6	6	7	15	6.9	.5	.0	3
Nashville [1]	546	165	72	29.46	30.06	−.06	37.2	.....	65	5	45	12	19	29	32	33	28	71	3.50	−.6	9	9.4	nw.	33	w.	6	5	6	17	7.2	.9	.0	2
Lexington	989	6	.....	28.99	30.10	−.01	31.5	−3.9	60	5	40	6	19	24	35	.....	.....	.....	2.82	−.8	12	.....	.....	.....	.....	.....	5	7	16	.....	3.6	.0	2
Louisville [2]	525	106	120	29.47	30.05	−.06	33.2	−4.0	59	5	39	11	19	27	29	29	25	73	2.58	−1.0	8	9.3	nw.	31	sw.	4	6	4	18	7.5	.1	.0	2
Evansville [1]	431	5	38	29.58	30.06	−.05	33.4	.....	63	5	40	6	19	27	32	30	26	77	3.00	−.2	10	9.4	nw.	34	w.	4	4	7	17	7.4	3.9	.0	2
Indianapolis [1]	823	98	129	29.14	30.05	−.05	28.6	−2.5	50	16	34	4	19	23	23	25	22	82	3.78	+1.0	9	8.8	w.	22	e.	6	5	5	18	7.6	2.3	.0	1
Terre Haute [1]	575	68	149	29.44	30.08	.....	30.4	.....	53	14	36	6	19	24	27	27	24	80	4.05	+1.4	12	10.1	nw.	31	nw.	6	3	9	16	7.3	3.8	.0	2
Cincinnati [2]	627	11	51	29.36	30.06	−.04	30.4	−2.4	52	16	37	5	19	24	23	28	24	77	2.71	−.3	13	8.3	nw.	21	w.	18	5	4	19	7.7	2.9	T	1
Columbus	822	90	210	29.13	30.03	−.06	28.6	−2.1	50	16	35	2	19	22	24	24	21	79	2.11	−.6	10	10.7	w.	31	n.	7	8	3	17	6.8	.6	T	0
Dayton [2]	900	186	213	29.05	30.05	.....	28.6	−2.8	50	16	35	3	19	22	21	24	22	84	2.88	+.2	10	10.4	nw.	30	w.	18	7	2	19	7.3	1.2	T	0
Elkins [3]	1,947	61	78	27.89	30.02	−.08	26.3	−5.3	59	17	35	−7	3	18	47	22	19	81	2.16	−.9	16	7.8	w.	28	nw.	18	3	4	21	8.0	13.3	3.7	0
Parkersburg	637	77	84	29.33	30.04	−.06	30.2	−4.0	58	16	38	9	3	23	27	27	22	72	1.56	−1.6	10	7.3	w.	26	w.	18	5	8	15	6.9	3.3	T	0
Pittsburgh [1]	842	39	54	29.07	29.99	−.10	25.6	−4.9	53	17	33	2	3	19	26	23	19	79	2.18	−.4	17	12.6	nw.	33	w.	1	2	10	16	7.2	9.4	2.2	0
Lower Lake Region							**21.6**	**−3.1**										**85**	**2.87**	**+0.5**										**7.7**			
Buffalo [3]	768	243	280	29.10	29.97	−.09	20.9	−3.4	44	17	27	1	2	15	21	19	16	83	4.26	+1.3	22	15.8	w.	43	w.	19	4	5	19	7.9	28.0	7.0	0
Canton	448	10	61	29.40	29.90	.....	15.2	−2.8	43	28	23	−17	3	7	31	14	11	87	2.28	.0	17	8.6	w.	27	sw.	19	7	3	18	7.3	16.9	5.5	0
Ithaca	836	77	100	.....	.....	.....	21.4	−3.1	45	17	28	−2	4	14	28	.....	.....	.....	1.90	−.1	20	11.6	nw.	30	nw.	21	0	6	22	8.6	22.8	1.7	0
Oswego	335	71	85	29.54	29.92	−.14	22.0	−1.9	42	17	27	−5	3	17	21	21	16	74	3.15	+.5	15	13.0	nw.	28	nw.	21	2	7	19	8.4	20.9	5.8	0
Rochester [1]	523	5	69	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Syracuse [1]	596	5	51	29.25	29.92	−.15	20.4	−2.5	47	17	28	−13	3	13	28	19	17	89	3.55	+.8	18	11.6	sw.	29	sw.	19	4	1	23	8.3	33.2	5.8	0
Erie [2]	714	57	81	29.20	30.01	−.06	23.4	−3.5	45	17	29	4	3	18	19	20	18	90	2.14	−.4	16	8.9	w.	24	nw.	1	6	7	15	6.9	11.4	3.0	0
Cleveland [1]	762	27	54	29.17	30.02	−.05	24.2	.....	47	16	30	0	19	18	24	22	20	86	3.98	+1.5	21	11.4	nw.	32	w.	18	2	7	19	7.9	20.7	1.6	0
Sandusky	629	5	67	.....	.....	.....	24.8	−2.6	47	16	31	1	19	19	21	.....	.....	.....	2.70	+.6	16	9.8	nw.	26	nw.	18	4	8	16	7.2	11.4	.5	0
Toledo [2]	628	79	87	29.34	30.05	−.02	23.4	−3.9	44	16	29	1	19	18	17	21	18	84	2.70	+.6	13	10.5	nw.	27	n.	7	6	6	16	6.8	9.0	T	0
Fort Wayne [1]	857	69	84	29.10	30.06	.....	22.8	−3.8	42	16	30	−1	19	16	29	21	19	88	3.31	+1.0	11	9.2	nw.	26	nw.	18	6	4	18	7.4	5.6	T	0
Detroit [1]	730	5	78	29.23	30.05	−.01	22.6	.....	44	16	28	2	19	17	21	21	17	80	1.60	−.6	14	10.7	nw.	27	nw.	7	2	11	15	7.6	9.3	T	0
Upper Lake Region							**20.3**	**+1.4**										**82**	**0.98**	**−0.8**										**7.6**			
Alpena	609	5	89	29.37	30.06	+.03	19.0	+1.0	39	16	26	−6	3	12	28	18	16	86	.70	−1.0	10	12.0	nw.	31	nw.	17	2	7	19	8.0	8.0	4.0	0
Escanaba	612	51	72	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grand Rapids [3]	707	70	244	29.26	30.06	+.01	22.9	−.8	40	16	29	2	19	17	23	18	15	84	.91	−1.3	10	10.0	n.	31	ne.	6	7	5	16	7.1	12.8	3.7	0
Lansing [3]	878	5	90	29.07	30.06	.....	20.6	−2.6	39	16	27	−2	2	14	28	18	16	85	.84	−1.1	13	8.7	nw.	22	n.	7	2	9	17	7.7	10.1	1.8	0
Marquette	734	44	73	29.28	30.12	+.07	20.2	+3.9	39	5	25	−6	18	15	23	18	15	82	.76	−1.1	13	9.0	nw.	22	nw.	19	0	6	22	8.8	8.1	4.0	0
Sault Sainte Marie [3]	614	11	52	29.38	30.08	+.05	14.8	+2.2	34	28	22	−15	2	8	28	13	9	81	.82	−.6	7	10.8	nw.	34	w.	17	6	5	17	7.1	7.9	5.2	0
Chicago	673	7	131	29.34	30.09	+.01	26.6	+.3	40	16	30	2	18	23	22	24	19	72	3.03	+.9	10	10.3	nw.	29	ne.	6	2	5	21	8.3	9.2	.0	0
Green Bay	617	109	141	29.41	30.11	+.05	20.0	+2.6	36	16	27	−11	19	13	28	18	15	80	.79	−.8	7	10.0	n.	24	n.	7	6	6	16	6.7	9.0	T	0
Milwaukee [1]	681	33	66	29.33	30.10	+.04	22.2	+1.0	37	16	28	−6	19	16	25	21	17	80	.50	−1.3	8	11.3	nw.	31	nw.	17	4	5	19	7.7	6.4	T	0
Duluth	1,133	5	47	28.87	30 16	+.08	16.0	+4.6	41	28	24	−22	18	8	44	12	9	86	.43	−.6	7	10.0	nw.	45	nw.	16	5	7	16	7.0	6.4	.5	0
North Dakota							**14.3**	**+6.8**										**85**	**0.38**	**−0.1**										**7.7**			
Moorhead (Fargo)	940	50	58	29.11	30.18	+.07	13.4	+5.3	38	28	23	−18	17	4	43	12	10	86	.22	−.5	8	10.2	n.	35	nw.	16	3	11	14	7.2	3.3	.1	0
Bismarck [1]	1,677	4	41	28.27	30.15	+.03	16.8	+8.3	48	4	26	−21	17	7	40	15	13	83	.30	−.1	11	9.4	nw.	34	e.	22	1	8	19	8.2	6.0	1.4	0
Devils Lake	1,478	11	44	28.50	30.16	+.05	11.6	+6.5	36	4	21	−23	17	3	33	10	9	91	.23	−.3	7	7.8	se.	26	nw.	16	1	9	18	8.2	2.6	.5	0
Lemmon, S. Dak.	2,602	4	38	27.26	30.11	.....	17.6	.....	53	4	27	−19	17	9	36	16	13	.....	.66	.....	3	.....	nw.	.....	.....	.....	.....	3	5	20	.....	10.2	6.0	0
Grand Forks	832	11	71	29.24	30.21	.....	9.6	.....	32	28	20	−21	17	−1	44	9	7	.....	.28	.....	9	.....	nw.	.....	.....	.....	.....	4	9	15	.....	3.5	T	0
Williston	1,878	42	50	28.05	30.12	+.01	15.3	+7.2	47	4	23	−20	17	7	34	14	11	79	.79	+.4	8	6.3	se.	24	nw.	15	4	8	16	7.3	9.4	6.0	0
Upper Mississippi Valley							**26.4**	**+0.7**										**80**	**2.08**	**+0.4**										**7.5**			
Minneapolis-St. Paul, Minn. [1]	919	32	61	29.10	30.15	+.06	20.8	.....	42	28	28	−15	18	14	32	18	13	73	.45	−.5	8	9.0	n.	28	nw.	16	3	6	19	7.6	5.2	T	0
Springfield, Minn.	1,025	4	42	28.99	30.14	.....	20.6	.....	41	28	28	−12	18	13	30	18	13	.....	.24	.....	5	.....	e.	.....	.....	.....	4	6	18	.....	3.2	T	0
La Crosse [2]	714	11	48	29.32	30.14	+.06	21.2	+2.0	40	28	28	−18	20	14	37	17	13	79	.93	−.1	5	4.9	nw.	15	nw.	16	5	6	17	7.3	11.8	2.0	0
Madison [2]	974	70	78	29.02	30.12	+.05	20.4	+1.3	36	16	26	−5	19	15	23	18	15	81	.41	−1.1	7	7.7	nw.	23	nw.	16	4	5	19	7.6	5.0	T	0
Charles City	1,015	10	51	29.00	30.14	+.04	20.6	+3.5	38	28	29	−18	20	13	39	19	16	82	1.15	.0	2	6.2	n.	19	n.	6	2	12	14	7.0	12.5	.8	0
Davenport [2]	606	66	161	29.43	30.13	+.03	25.5	+.6	42	28	31	2	18	20	25	23	20	83	.96	−.6	8	9.6	ne.	25	n.	6	3	9	16	7.5	8.1	T	0
Des Moines [3]	860	5	99	29.14	30.10	−.01	24.7	+1.0	45	3	31	−3	18	19	29	22	19	83	1.20	+.1	8	9.6	n.	28	n.	6	3	4	21	8.1	10.6	T	0
Dubuque	699	60	79	29.34	30.13	+.04	24.2	+2.0	41	28	30	0	17	19	26	22	17	74	.52	−.9	7	6.9	nw.	20	nw.	6	4	6	18	7.4	3.9	T	0
Burlington [1]	702	6	35	29.30	30.09	.....	26.6	−1.0	43	28	32	2	17	21	26	24	20	78	2.57	+.8	10	9.3	nw.	27	nw.	6	1	9	18	7.7	6.2	.0	3
Cairo	358	87	93	29.68	30.07	−.05	36.7	−1.8	60	5	43	16	18	30	22	.....	.....	.....	4.52	+1.4	11	9.1	nw.	42	sw.	6	5	6	17	7.3	1.3	.0	2
Peoria [3]	609	11	45	29.44	30.08	−.02	26.8	+.9	41	28	32	4	2	21	22	24	22	85	4.95	+2.9	10	7.0	e.	20	n.	6	3	7	18	7.4	8.9	.5	2
Springfield, Ill. [3]	636	5	191	29.36	30.07	−.03	29.9	+.4	50	14	36	8	18	24	24	26	24	85	4.82	+2.5	12	7.3	nw.	23	n.	6	3	5	20	8.1	9.4	.0	4
St. Louis [3]	568	179	303	29.44	30.07	−.04	34.0	−.8	59	14	40	9	18	27	26	30	26	74	2.54	.0	12	11.5	nw.	30	nw.	6	6	9	13	6.5	9.3	.0	3
Missouri Valley							**27.5**	**+1.8**										**83**	**2.02**	**+0.6**										**7.0**			
Columbia, Mo. [3]	784	6	66	29.20	30.07	−.04	32.4	+.7	62	5	40	6	18	25	28	28	25	82	3.65	+1.6	14	8.3	nw.	27	nw.	6	5	10	13	6.7	10.4	.0	2
Kansas City [1]	963	38	76	29.00	30.06	−.05	32.2	.....	58	4	40	8	17	25	28	30	26	79	3.16	+1.4	14	10.5	nw.	33	nw.	6	5	7	16	7.2	5.1	T	3
St. Joseph [2]	967	11	49	29.01	30.09	.....	29.6	.0	56	3	37	5	17	23	28	27	25	90	2.87	+1.2	13	9.2	nw.	27	nw.	6	4	7	17	7.5	15.5	1.9	2
Springfield, Mo. [1]	1,324	5	60	28.60	30.04	−.07	33.9	.....	70	5	43	0	19	25	32	30	26	79	2.19	−.2	11	12.3	se.	38	sw.	4	7	8	13	6.4	6.5	.0	3
Topeka	987	65	87	28.98	30.06	.....	32.4	+1.4	63	4	41	7	18	24	29	29	26	80	1.85	+.3	10	8.8	e.	26	nw.	6	5	10	13	6.7	4.0	T	1
Lincoln [3]	1,189	11	81	28.78	30.10	.00	26.3	+.2	55	4	33	0	18	19	25	23	21	86	.99	.0	10	8.6	n.	25	e.	22	6	8	14	6.6	8.5	2.0	1
Omaha [1]	1,105	31	44	28.88	30.11	.00	24.5	.....	48	3	32	−4	28	17	36	23	20	84	1.93	+1.0	11	10.4	nw.	34	nw.	16	3	10	15	7.2	21.9	8.1	0
Valentine	2,598	46	54	27.26	30.08	−.01	23.7	+2.3	53	4	33	−12	27	14	41	21	17	77	.97	+.4	8	7.0	n.	26	n.	16	6	8	14	6.6	9.7	6.0	0
Sioux City [1]	1,138	5	27	28.85	30.12	.00	21.6	.....	43	3	30	−10	18	13	31	20	18	85	.50	.....	8	9.4	nw.	30	w.	16	3	6	19	7.5	5.8	1.0	0
Huron	1,301	26	41	28.68	30.14	+.02	20.4	+6.1	44	5	30	−10	18	11	30	18	16	84	.59	.0	6	11.7	n.	40	nw.	16	5	5	18	7.5	7.2	1.4	0

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch, or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Thunderstorms
	Ft.	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	°F.	%	*In.*	*In.*		*Miles*								*0–10*	*In.*	*In.*	
Northern Slope							**29.3**	**−1.6**										**79**	**0.79**	**+0.1**										**6.8**			
Billings [1]	3,570	18	39	26.27	30.06	.....	22.2	.....	44	4	30	−8	17	14	27	20	15	74	.75	.....	9	11.2	sw.	36	n.	15	4	11	13	6.6	9.8	1.3	0
Havre	2,507	11	67	27.37	30.13	+.06	15.6	+2.0	47	4	26	−16	25	6	45	14	11	81	.68	+.2	9	7.4	sw.	28	n.	15	4	7	17	7.4	10.2	3.0	0
Helena [1]	4,124	5	35	25.76	30.17	+.06	15.5	−6.1	45	4	25	−26	17	6	38	15	12	83	.49	−.2	8	6.0	w.	30	n.	15	3	6	19	7.8	11.8	11.2	0
Missoula [2]	3,205	80	91	26.63	30.13	.....	24.6	−2.1	44	5	32	−13	17	17	26	21	18	82	.71	−.1	13	5.8	sw.	39	ne.	16	4	7	17	7.5	10.6	2.3	0
Kalispell	2,973	48	56	26.93	30.10	+.02	22.7	−.6	42	4	30	−15	17	15	27	22	19	82	1.48	+.4	14	4.4	w.	18	n.	21	2	6	20	8.0	25.0	9.2	0
Miles City [2]	2,371	48	55	27.50	30.09	.00	21.4	+4.6	47	4	30	−14	18	12	37	19	16	81	.54	.0	10	6.0	nw.	24	n.	15	4	11	13	7.0	5.9	2.8	0
Rapid City [2]	3,259	50	58	26.58	30.08	.00	23.0	−.4	56	4	32	−7	17	14	31	20	16	79	.44	.0	9	6.2	n.	25	n.	15	6	9	13	6.4	5.2	.6	0
Cheyenne [1]	6,094	5	39	23.84	30.03	.00	21.4	.....	50	3	32	−12	17	11	30	18	11	64	.58	−.1	8	11.6	nw.	43	nw.	5	5	10	13	6.5	7.4	.2	0
Lander	5,352	60	68	24.56	30.11	+.03	13.6	−8.9	43	1	26	−28	18	2	31	13	9	77	1.22	+.6	9	3.5	sw.	27	w.	1	8	11	9	5.6	12.6	6.7	0
Sheridan [6]	3,790	6	42	26.04	30.06	.....	22.0	−.6	49	4	33	−11	18	11	39	19	16	78	.43	−.3	7	7.3	nw.	39	nw.	17	4	11	13	6.8	5.2	T	0
North Platte [2]	2,821	11	51	27.03	30.07	.00	24.6	−2.0	57	3	34	−9	18	15	34	22	18	83	1.32	+.8	11	6.9	w.	26	n.	23	9	9	10	5.5	15.3	3.2	0
Middle Slope							**32.0**	**−1.5**										**74**	**1.30**	**+0.5**										**5.9**			
Denver [1]	5,292	106	113	24.61	30.03	+.02	24.1	−6.6	56	7	33	−4	17	15	32	18	13	71	1.44	+.9	14	7.0	s.	27	w.	5	4	13	11	6.4	19.5	3.5	0
Pueblo [1]	4,690	5	36	25.17	29.98	−.02	28.2	.....	63	7	42	−12	18	15	47	23	16	66	.45	.0	8	7.2	w.	41	nw.	5	9	7	12	5.9	9.0	.7	0
Concordia	1,392	50	58	28.55	30.08	−.01	29.8	.0	60	3	38	5	18	22	29	27	24	82	1.36	+.5	8	8.0	e.	24	nw.	4	8	8	12	6.1	10.0	2.0	0
Dodge City	2,509	10	86	27.35	30.02	−.04	31.7	−1.5	64	3	42	−4	18	21	34	27	22	74	1.24	+.5	10	11.4	n.	42	nw.	5	10	5	13	5.8	12.2	.8	0
Wichita [1]	1,358	6	64	28.56	30.04	−.04	33.8	−.6	65	4	43	2	18	24	31	30	27	81	1.93	+.7	7	14.9	n.	38	n.	23	9	7	12	5.8	4.3	.2	2
Oklahoma City [2]	1,214	10	47	28.71	30.02	−.05	40.8	+1.2	77	5	59	7	18	32	29	35	30	72	1.40	+.3	7	10.2	s.	28	nw.	5	10	8	10	5.6	2.7	.0	2
Southern Slope							**45.4**	**−0.5**										**56**	**0.54**	**−0.2**										**5.7**			
Abilene [2]	1,738	10	56	28.15	29.98	−.07	49.1	+1.9	82	5	60	15	18	38	38	40	29	53	.58	−.4	5	11.1	s.	30	s.	22	8	11	9	5.4	T	.0	0
Amarillo [2]	3,676	10	49	26.18	29.97	−.05	36.9	−1.2	70	7	51	0	18	23	42	29	21	61	.63	−.1	3	15.1	s.	46	n.	5	6	18	4	4.9	2.5	.3	1
Del Rio	960	63	71	29.98	29.98	−.02	54.3	−1.7	85	5	63	27	18	46	33	46	37	59	.75	+.2	9	9.7	se.	27	nw.	23	4	6	18	7.4	.0	.0	0
Roswell	3,566	75	85	26.29	29.95	−.03	41.4	−1.1	72	4	56	7	18	27	44	34	24	53	.21	−.4	3	8.2	s.	34	nw.	23	9	8	11	5.2	1.0	.0	0
Southern Plateau							**50.0**	**−1.2**										**46**	**0.71**	**+0.1**										**5.0**			
El Paso [2]	3,778	82	101	26.09	29.90	−.05	48.2	−.8	71	7	60	21	19	37	35	36	21	39	.72	+.3	3	8.9	w.	30	sw.	25	11	9	8	5.1	T	.0	1
Albuquerque [1]	5,314	5	45	24.62	29.90	.....	36.2	.....	63	4	48	7	18	24	36	29	17	48	.54	+.2	5	10.6	n.	40	s.	14	8	10	10	5.6	3.0	1.7	1
Phoenix [2]	1,107	39	87	28.75	29.92	−.07	52.8	−2.3	77	4	66	30	15	39	36	41	29	49	.24	−.5	2	5.2	e.	25	w.	22	11	6	11	5.2	.0	.0	0
Tucson [1]	2,555	5	23	27.28	29.90	.....	50.8	.....	78	4	65	28	20	37	40	41	29	49	1.92	+1.0	4	.....	se.	.....	.....	.....	10	8	10	5.6	T	.0	0
Yuma	142	9	54	29.79	29.94	−.06	57.5	−1.1	80	5	70	36	15	45	35	46	32	43	.84	+.4	2	5.8	n.	24	n.	8	16	6	6	3.6	.0	.0	0
Independence	3,957	5	26	25.91	29.98	−.08	41.6	−.6	64	6	54	20	15	30	33	32	16	...	.02	−.8	1	.....	se.	.....	.....	.....	10	10	8	.....	T	0	0
Middle Plateau							**30.1**	**−3.0**										**68**	**0.86**	**−0.1**										**6.2**			
Reno [2]	4,527	61	76	25.40	30.01	−.07	34.9	−1.4	54	2	44	16	25	36	30	30	23	65	.68	−.5	8	5.8	w.	32	s.	5	11	4	13	5.2	1.7	.0	0
Tonopah	6,090	9	20	23.93	29.97	.....	30.6	.....	53	6	39	12	14	22	25	28	25	...	.19	.....	3	.....	nw.	.....	.....	.....	9	13	6	.....	2.3	.0	0
Winnemucca	4,359	5	56	25.58	30.03	−.06	31.6	−1.9	54	2	41	10	28	22	37	28	22	68	.79	−.1	13	7.1	sw.	26	sw.	6	5	8	15	6.9	1.9	.0	0
Modena	5,473	10	46	.....	.....	.....	28.5	−2.5	52	7	40	−1	23	18	37	.....	.....	...	.51	−.4	8	8.9	sw.	32	sw.	21	6	8	14	6.6	8.3	.0	0
Salt Lake City [1]	4,227	86	47	25.57	30.07	−.01	27.0	−5.1	50	6	36	0	18	18	28	25	21	80	1.17	−.1	11	6.9	se.	40	nw.	7	8	6	14	6.1	8.4	T	1
Grand Junction	4,602	60	68	25.31	29.96	−.08	28.6	−4.3	54	4	38	−5	18	19	31	25	17	60	1.17	+.6	10	5.6	se.	26	w.	23	7	6	15	6.3	8.4	.0	0
Northern Plateau							**33.6**	**+0.6**										**79**	**1.18**	**−0.2**										**7.3**			
Baker [2]	3,471	36	54	26.42	30.08	−.04	28.2	−.8	46	1	36	5	18	20	27	27	24	83	.83	−.4	13	6.2	se.	20	n	16	4	7	17	6.9	9.0	T	0
Boise [1]	2,739	5	49	27.18	30.09	−.03	31.6	.....	50	1	39	8	18	24	25	29	25	76	1.41	.....	12	10.0	se.	30	se.	1	7	8	13	6.3	5.0	.0	2
Pocatello [1]	4,478	5	31	25.44	30.14	+.04	18.4	.....	42	6	29	−23	18	8	35	18	16	86	1.03	.....	12	7.4	sw.	32	sw.	5	5	4	19	7.3	10.1	.6	0
Spokane [1]	1,929	27	42	27.99	30.08	−.01	31.0	−.3	48	4	38	2	23	34	28	30	26	79	1.30	−.5	14	5.0	ne.	21	e.	16	1	8	19	8.0	7.9	.5	0
Walla Walla	991	57	65	28.98	30.08	−.03	38.1	+1.0	55	3	44	22	18	32	22	...	...	...	1.36	−.4	12	4.9	s.	26	w.	4	3	5	20	7.9	7.5	T	0
Yakima	1,076	58	67	28.90	30.07	.....	37.2	+2.7	56	15	44	22	19	30	25	34	28	71	1.25	+.3	12	4.2	nw.	18	nw.	11	5	4	19	7.5	5.4	.0	0
North Pacific Coast Region							**44.1**	**+2.2**										**78**	**3.22**	**−2.2**										**7.3**			
North Head	211	5	56	29.79	30.02	−.04	44.7	+1.7	54	2	49	35	22	40	16	42	40	83	5.62	−1.8	21	12.1	se.	43	s.	3	3	9	16	7.5	.0	.0	0
Seattle [2]	125	90	321	29.90	30.04	−.02	44.0	+2.9	56	6	49	29	22	39	19	40	35	76	2.27	−1.6	18	8.0	se.	33	s.	10	3	10	15	7.4	T	.0	1
Tacoma	194	172	201	29.83	30.04	−.02	42.8	+2.2	54	6	48	28	21	37	24	...	...	...	2.78	−1.9	15	7.1	n.	26	s.	3	3	9	16	7.6	.3	.0	0
Tatoosh Island	86	9	61	29.92	30.01	+.01	44.5	+3.5	52	7	48	36	23	41	9	42	37	75	2.90	−6.6	15	13.4	e.	50	e.	1	4	11	13	7.0	T	.0	0
Medford [1]	1,329	29	58	28.63	30.07	.....	42.0	.....	60	19	52	24	13	32	33	38	33	73	2.33	.0	12	.....	n.	.....	.....	.....	7	9	12	6.3	T	.0	0
Portland, Oreg. [2]	154	68	106	29.88	30.05	−.03	44.2	+2.1	56	10	49	30	22	39	18	40	37	84	4.19	−1.2	18	5.3	se.	22	w.	4	4	2	22	7.9	T	.0	2
Roseburg	510	45	76	29.50	30.06	−.04	44.2	+.8	63	19	52	28	14	36	35	41	37	78	2.42	−2.1	15	3.4	di.	19	sw.	4	2	10	16	7.5	.0	.0	0
Middle Pacific Coast Region							**49.8**	**0.0**										**70**	**5.78**	**+0.8**										**5.2**			
Eureka	60	72	88	30.00	30.08	−.03	47.3	+.1	59	1	53	34	25	41	18	45	42	82	6.22	−.3	13	8.0	se.	28	n.	12	10	10	8	5.5	.0	.0	2
Redding [1]	722	20	34	29.25	30.03	.....	48.5	−1.2	67	10	57	32	22	40	26	42	33	59	9.64	+3.0	12	8.3	nw.	25	s.	2	11	6	11	5.2	.0	.0	2
Sacramento [2]	66	92	115	29.94	30.02	−.07	49.9	−.2	66	10	58	34	25	42	25	45	39	70	2.98	.0	8	8.0	se.	27	nw.	13	12	6	10	4.8	.0	.0	1
San Francisco	155	112	132	29.85	30.02	−.08	53.4	+1.2	69	10	58	43	22	48	17	48	42	68	4.27	+.4	10	7.4	w.	23	w.	25	10	6	12	5.3	.0	.0	0
South Pacific Coast Region							**52.4**	**−0.6**										**66**	**0.93**	**−1.3**										**5.1**			
Fresno [1]	327	5	35	29.67	30.03	−.05	49.0	−1.3	67	20	60	28	14	38	30	44	39	72	.67	−.8	7	4.5	se.	24	nw.	7	9	7	12	5.6	.0	.0	0
Los Angeles	338	223	250	29.62	29.98	−.08	55.7	+.2	73	8	65	35	15	46	27	47	38	56	1.05	−2.0	4	7.1	ne.	36	e.	21	13	9	6	4.3	T	.0	0
San Diego [1]	87	20	55	29.89	29.98	−.08	55.6	.....	73	10	65	36	15	46	29	49	44	69	1.06	−1.0	8	6.6	ne.	24	sw.	13	9	9	10	5.5	.0	.0	2

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch, or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Thunderstorms
West Indies	*Ft.*	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	*°F.*	*°F.*	*°F.*		*°F.*	*°F.*		*°F.*	*°F.*	*°F.*	*°F.*	%	*In.*	*In.*		*Miles*								*0–10*	*In.*	*In.*	
San Juan, P. R.	82	10	54	29.84	29.93		76.8	−1.9	91	25	82	67	7	72	17				.81	−2.0	9	11.0	ne.	37	n.	23	8	14	6	4.9	.0	.0	0
Panama Canal																																	
Balboa Heights	118	6	92		[3]29.79		82.3	+2.0	95	26	92	70	24	73	22			[5]75	.44	−.2	3	8.9	nw.	25	n.	14	8	20	0	4.2	.0	.0	0
Cristobal	36	6	97		[3]29.82		82.2	+1.4	88	24	86	74	24	78	14	76	74	[5]79	.69	−.8	13	12.1	n.	23	n.	4	2	21	5	5.9	.0	.0	0
Alaska																																	
Fairbanks	484	11	87		[4]29.82		11.5	+12.3	44	12	21	−17	28	2				79	.26	−.2	6	4.4	e.	24	e.	14	4	5	19		3.8	11.0	0
Juneau	80	96	116		[4]29.95		35.8	+5.6	46	14	39	26	24	32				83	7.54	+2.0	18	7.3	s.	24	se.	27	3	3	22		12.3	2.0	0
Nome	22	25	51		[4]29.65		17.1	+11.9	36	13	23	−10	11	11				78	.96	+.1	15	13.4	ne.	43	n.	1	3	6	19		9.7	16.4	0
Hawaiian Islands																																	
Honolulu	38	86	100	29.96	30.00		72.0	−1.2	82	12	76	61	26	68	13	65	62	75	3.28	−.5	11	9.9	ne.	38	ne.	26	6	15	7	5.6	.0	.0	0

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Alaska																																	
Anchorage	132	6	47	[4]29.46	[4]29.62		24.0	+11.6	46	13	29	−1	27	19	15	24	22	89	0.35	−.5	7	4.6	n.	21	n.	19	5	8	18	6.9	1.7	.8		
Barrow	13	4	27																														
Bethel	22	7	33																														
Fairbanks	484	11	87	[4]29.22	[4]29.79		.9	+11.9	35	20	9	−28	31	−7	33	2	0	90	.26	−.7	6	3.1	n.	14	ne.	31	6	9	16	6.5	5.3	14.5		
Juneau	80	96	1																														
Ketchikan	75	69	85	[4]29.87	[4]29.89		42.4	+8.8	58	19	47	25	1	38	21	40	37	82	14.77	+1.1	24	9.0	se.	35	se.	19	2	2	27	9.0	T	.0		
Nome	22	25	51		[4]29.60		19.5	+16.0	46	7	25	−10	26	14	22				.63	−.4	13		n.	42	e.	1	11	2	18		4.8	10.4		

[1] Data are airport records.
[2] Barometric data (adjusted to old city elevation) and hygrometric data from airport; otherwise city office records.
[3] Observations taken bihourly.
[4] Pressure not reduced to a mean of 24 hours.
[5] Barometric data from airport records, other data from city office records.
[6] Wind, clear, partly cloudy, and cloudy data from city office records, other data from airport.

NOTE.—Except as indicated by notes 1, 2, 5, and 6, data in table are city office records.

SEVERE LOCAL STORMS, FEBRUARY 1942

[Compiled by Mary O. Souder]

The table herewith contains such data as has been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Arkansas, south-central portion, in the following Counties: Pike, Montgomery, Scott, Clark, Garland, Hot Spring, Saline, Grant, Arkansas, Pulaski, Carroll, and Randolph.	5	7 to 10:30 p. m.		7	$1,745,000	3 tornadoes and hail.	The first tornado was reported in Pike and Scott Counties shortly after 7 p. m., from which no damage was reported. The most destructive of these tornadoes occurred in Pulaski County, particularly Little Rock, at 8:50 p. m. In Little Rock proper, the track of the storm began in the vicinity of 12th and Battery Sts. and ran to the Arkansas River just east of Main St. Property damage was confined principally to broken plate glass windows and signs, although a wall of a building on Scott St. collapsed, badly damaging several parked automobiles. There was some damage to roofs, chimneys and electric wires. Less sturdily constructed buildings in other sections of the State were completely demolished. The third tornado, in Randolph County, occurred at 10:30 p. m. In other sections of the State, the paths of the tornadoes were through more sparsely settled communities and open country and forests. 7 persons were killed in Pulaski and Saline Counties and about 70 injured throughout the State. In Pulaski County the property damage is estimated at approximately $1,000,000. In other sections of the State property loss is believed to be in excess of $745,000. Large hail fell at about the time of these tornadoes, damaging windows and fruit trees.
Verona and Brewer, Miss.	6	2 a. m.	1,320	1		Tornado	Storm moved from southwest to northeast. 27 persons were injured with considerable property damage over a path 3 miles long.
Hodgens, Okla., vicinity of	6	6 p. m.	100	1	10,000	Tornado and hail.	Many trees uprooted and homes and other buildings damaged or destroyed. Crops not sufficiently advanced to have been injured. Path 6 miles long and from west to east.
New York State, central and western sections.	7–8					Heavy snow	Secondary roads impassable; some country schools closed; airplane service at the Buffalo airport at standstill.
Hachita, N. Mex., vicinity of	10	9:30 p. m.		4		Severe rain	5 Army training planes lost.
Delta Farms, La., vicinity of	15	6:30 a. m.	150		3,800	Wind	A house demolished, 2 others badly damaged, and 3 others blown off their foundations.

SOLAR RADIATION AND SUNSPOT DATA FOR JANUARY 1942

[Solar Radiation Investigations Section, I. F. HAND in charge]

SOLAR RADIATION OBSERVATIONS

Explanations of the tables, and references to descriptions of instruments, stations and methods of observation, and to summaries of data, are given in the January 1942 REVIEW, p. 20.

TABLE 1.—*Solar radiation intensities during February 1942*

[Gram-calories per minute per square centimeter of normal surface]

MADISON, WIS.

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.					P. M.				Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Feb. 2		1.10	1.19	1.22	1.37	1.50		1.08			
Feb. 12		.80	.96	1.11	1.34	1.59	1.25				
Feb. 13		.47	.48	.65	.54						
Feb. 17		1.03									
Feb. 20		.66	.80	.75	.81		1.22				
Means		**.81**	**.86**	**.94**	**1.03**	**(1.54)**	**(1.24)**	**(1.08)**			
Departures		**−.11**	**−.20**	**−.25**	**−.33**	**−.06**	**−.09**	**−.09**			

LINCOLN, NEBR.

Feb. 3	3.81				1.27						5.36
Feb. 4	4.75						1.24	1.12	0.96		6.27
Feb. 6	4.17						1.36	1.20	1.07	0.94	3.99
Feb. 10	2.49	0.89	1.00	1.16	1.33		1.34	1.20	.96		2.87
Feb. 11	3.00	.81	.92	1.11							3.15
Feb. 16	3.00						1.40	1.22	1.09	.92	1.90
Feb. 18	.91	.94	1.02	1.16	1.36		1.40	1.27	1.13	1.05	1.07
Feb. 19	1.24	.75	1.04	1.22	1.35						2.62

TABLE 1.—*Solar radiation intensities during Febrnary 1942*—Con.

LINCOLN, NEBR.—Continued

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.					P. M.				Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Feb. 20	1.52						1.20	1.01	.81	.68	3.15
Feb. 24	1.60						1.31	1.13	1.00	.92	1.96
Feb. 27	1.37	.83	1.04	1.18	1.31		1.31	1.18			1.60
Means		**.84**	**1.00**	**1.17**	**1.32**		**1.32**	**1.17**	**1.00**	**.90**	
Departures		**−.09**	**−.03**	**0**	**−.05**		**−.03**	**−.06**	**−.02**	**−.02**	

BLUE HILL, MASS.

Feb. 2	1.4	0.72	0.87	1.06	1.25			1.14	1.01	0.95	1.6
Feb. 3	.7	1.07	1.18		1.46			1.26			.7
Feb. 4	.6	1.02	1.14	1.20						.92	1.0
Feb. 9	1.3		1.01		1.31		1.30	1.15	1.02	.93	1.9
Feb. 10	1.1	.90						1.08	.95		1.3
Feb. 12	.9	.91									1.5
Feb. 13	.8	1.04	1.12				1.26	1.14			1.2
Feb. 15	2.4	.62	.75	.90							2.4
Feb. 18	2.4			1.12			1.27	1.16		.90	2.0
Feb. 19	2.6							1.20	1.06	.93	1.9
Feb. 20	.9	.74	.85		1.20						1.1
Feb. 21	.9	.89	.98								1.1
Feb. 22	1.3		1.10	1.20							1.8
Feb. 24	1.6	.93	1.01	1.10			1.06	.74	.66	.54	2.3
Feb. 25	2.6	.78	.85								2.0
Feb. 26	2.4			1.07	1.26						1.9
Feb. 27	2.3	.92									2.1
Means		**.88**	**.99**	**1.09**	**1.30**		**1.22**	**1.11**	**.94**	**.86**	
Departures		**−.05**	**−.06**	**−.01**	**0**		**−.06**	**−.04**	**−.08**	**−.07**	

*Extrapolated.

TABLE 2.—*Average daily totals and weekly means of solar radiation (direct and diffuse) received on a horizontal surface*

[Gram-calories per square centimeter]

Date	Washington	Madison	Lincoln	Chicago	New York	Fresno	Fairbanks	Cambridge	Nashville	Twin Falls	La Jolla	New Orleans	Riverside	Blue Hill	Friday Harbor	Ithaca	Newport	San Juan	State College	San Juan
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mg. cal.*
Jan. 29	343	110	174	126	311	179	44	293	310	185	362	393	351	296	188	223	311	238	305	52
Jan. 30	186	34	10	18	160	168	50	259	52	177	234	193	234	275	77	182	299	250	142	89
Jan. 31	49	61	89	41	13	243	45	67	19	172	321	322	307	89	28	51	105	567	10	227
Feb. 1	202	196	218	164	129	102	12	74	151	290		415	278	64	123	153	141	517	143	260
Feb. 2	204	290	45	129	275	131	12	283	316	119		419	301	293	84	206	300	283	289	90
Feb. 3	381	64	250	117	310	276	27	316	193	133		400	286	324	102	268	328	421	306	260
Feb. 4	326	24	214	13	99	132	62	228	113	63		205	298	262	119	114	208	254	130	75
Mean	**242**	**111**	**143**	**87**	**185**	**176**	**36**	**217**	**165**	**163**		**335**	**294**	**229**	**103**	**171**	**242**	**381**	**189**	**151**
Feb. 5	151	59	70	27	10	83	47	52	235	241		184	308	58	214	70	36	403	50	176
Feb. 6	170	18	227	7	24	130	30	51	49	133		387	152	66	90	100	104	270	46	48
Feb. 7	164	172	213	20	8	372	33	25	23	123		433	225	25	189	36	16	532	74	317
Feb. 8	304	152	18	360	226	261	17	91	191	158		299	398	82	98	119	126	638	174	
Feb. 9	392	52	128	61	356	305	18	331	301	154		173	403	339	97	358	344	550	351	318
Feb. 10	125	190	327	28	156	331	57	266	37	241		36	311	287	196	300	238	487	86	314
Feb. 11	175	216	250	98	195	367	63	223	59	241		152	426	126	222	132	238	523	133	314
Mean	**212**	**123**	**176**	**86**	**139**	**264**	**38**	**148**	**128**	**184**		**238**	**318**	**140**	**158**	**160**	**158**	**480**	**131**	**248**
Feb. 12	345	308	226	193	341	303	37	308	366	238		312	374	322	253	355	355	530	336	279
Feb. 13	391	271	50	258	377	411	63	325	349	289	303	354	112	339	220	254	360	489	274	307
Feb. 14	362	98	29	49	279	402	27	246	353	312		230	326	259	184	267	238	506	270	
Feb. 15	186	92	62	46	40	398	28	270	36	154			289	310	261	297	285	150	52	
Feb. 16	51	76	347	37	62	380	86	206	46	227		87	410	210	106	34	206	458	13	243
Feb. 17	134	334	230	249	101	386	18	93	65	397		245	400	76	50	52	89	526	77	263
Feb. 18	249	251	381	245	361	372	62	364	113	404		67	398	373	281	284	374	563	332	284
Mean	**245**	**204**	**190**	**154**	**223**	**379**	**46**	**259**	**190**	**289**		**216**	**330**	**270**	**194**	**220**	**272**	**462**	**194**	**279**
Feb. 19	414	319	356	209	383	400	62	251	351	404		405	408	249	144	326	232	521	231	283
Feb. 20	372	333	288	180	322	369	17	302	353	308		424	424	302	94	230	344	479	277	234
Feb. 21	375	148	343	72	356	130	106	280	306	182	155	326	77	250	338	207	308	592	265	314
Feb. 22	420	381	99	362	386	447	133	208	389	316	289	463	404	256	277	141	378	572	174	365
Feb. 23	429	127	62	112	231	431	13	344	77	377	321	37	392	332	45	212	254		242	296
Feb. 24	401	164	390	163	394	313	48	346	104	371	341	216	421	376	207	234	394	419	380	332
Feb. 25	447	218	255	137	361	348	92	358	95	195	450	293	464	371	191	224	389	426	202	295
Mean	**408**	**241**	**256**	**176**	**348**	**348**	**67**	**298**	**239**	**307**	**311**	**309**	**370**	**305**	**185**	**225**	**329**	**523**	**253**	**305**
DEPARTURES FROM WEEKLY NORMALS																				
Jan. 29	+39	−73	−71	−33	+15	−6	−6	+39		−28		+94	+56	+13	−1	+8	+37		+50	
Feb. 5	−2	−77	−76	−52	−36	+11	−23	−49		−11		+9	+42	−83	+40	−22	−66		−26	
Feb. 12	+19	−19	−69	+2	+29	+90	−32	+45		+31		−36	+32	+33	+34	+40	+23		+2	
Feb. 19	+144	−14	−30	−12	+120	+93	−34	+55		+49	−51	+20	+49	+35	+22	+3	+59		+17	
	+1400	**−1281**	**−1722**	**−665**	**+896**	**+1316**	**−665**	**+630**		**+287**		**+672**	**+1253**	**−14**	**+665**	**+203**	**+371**		**+301**	
ACCUMULATED DEPARTURES ON FEB. 25																				
	+1757	**−889**	**−1330**	**+168**	**+1099**	**+756**	**−875**	**−14**		**+287**		**+2212**	**+931**	**−140**	**+1491**	**+511**	**+68**			

NOTE.—See corrections for Cambridge for January 1942 on inside cover of this REVIEW.

POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR FEBRUARY 1942

[Communicated by Capt. J. F. Hellweg, U. S. Navy (Ret.), Superintendent, U. S. Naval Observatory.] All measurements and spot counts were made at the Naval Observatory from plates taken at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive toward the north. Areas are corrected for foreshortening and expressed in millionths of Sun's hemisphere. For each day, under longitude, latitude, area of spot or group, and spot count, are included assumed longitude of center of the disk, assumed latitude of center of the disk, total area of spots and groups, and total spot count.

Date	Eastern standard time	Mount Wilson group No.	Heliographic				Area of spot or group	Spot count	Plate quality	Observatory
			Difference in longitude	Longitude	Latitude	Distance from center of disk				
1942	*h m*		°	°	°	°				
Feb. 1	11 29	7364	−65	129	−10	65	48	1	G	U. S. Naval.
		7362	−37	157	−5	37	48	3		
		7362	−32	162	−8	32	194	3		
		7365	−3	191	+8	14	48	5		
				(194)	(−6)		338	12		
Feb. 2	11 2	7364	−51	130	−10	51	48	1	G	Do.
		7366	−25	156	+12	31	48	9		
		7362	−19	162	−8	19	242	6		
		7365	+10	191	+8	17	12	2		
				(181)	(−6)		350	18		
Feb. 3	11 17	7364	−38	130	−10	38	36	2	G	Do.
		7366	−10	158	+11	20	145	18		
		7362	−5	163	−8	5	218	4		
		7365	+24	192	+8	28	97	12		
				(168)	(−6)		496	36		
Feb. 4	11 3	7364	−25	130	−10	25	48	1	G	Do.
		7366	+3	158	+11	18	194	2		
		7368	+6	161	−3	6	18	1		
		7362	+9	164	−8	9	242	9		
		7365	+46	201	+8	50	145	12		
				(155)	(−6)		647	25		
Feb. 5	13 46	7364	−10	130	−10	11	24	1	G	Mt. Wilson.
		7366	+18	158	+11	25	194	23		
		7368	+20	160	+1	21	61	5		
		7362	+23	163	−8	23	291	15		
		7365	+50	190	+7	53	242	18		
				(140)	(−6)		812	62		
Feb. 6	11 10	7364	+3	131	−10	4	24	1	F	U. S. Naval.
		7369	+22	150	−5	22	48	4		
		7366	+30	158	+11	36	291	20		
		7368	+34	162	+1	35	24	1		
		7362	+35	163	−8	35	291	12		
		7365	+63	191	+7	65	388	12		
				(128)	(−6)		1,066	50		
Feb. 7	11 17	7364	+15	130	−10	15	12	1	G	U. S. Naval
		7364	+18	133	−7	18	12	1		
		7369	+35	150	−5	35	97	6		
		7366	+43	158	+11	47	339	18		
		7362	+49	164	−8	49	388	16		
		7368	+49	164	0	50	24	3		
		7365	+77	192	+8	79	388	14		
				(115)	(−6)		1,260	59		
Feb. 8	11 24	7369	+50	152	−5	51	97	4	P	Do.
		7366	+57	159	+11	60	339	9		
		7362	+62	164	−8	62	388	13		
		7368	+65	167	0	66	12	2		
				(102)	(−6)		836	28		
Feb. 9	10 47	7370	−51	38	−11	51	48	7	F	Do.
		7369	+69	158	−5	69	194	6		
		7366	+70	159	+11	73	194	5		
		7362	+76	165	−8	76	242	4		
				(89)	(−7)		678	22		
Feb. 10	15 7	7371	−70	3	+12	73	145	1	P	Do.
		7370	−38	35	−12	38	24	1		
		7370	−36	37	−11	36	48	1		
				(73)	(−7)		217	3		

POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR FEBRUARY 1942—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic				Area of spot or group	Spot count	Plate quality	Observatory
			Difference in longitude	Longitude	Latitude	Distance from center of disk				
1942	*h m*		°	°	°	°				
Feb. 11	10 24	7372	−86	337	+13	86	194	1	F	Do.
		7371	−59	4	+13	62	97	1		
		7370	−27	36	−12	27	24	2		
		7370	−24	39	−11	24	48	2		
				(63)	(−7)		363	6		
Feb. 12	10 55	7374	−73	336	+19	76	145	7	G	Do.
		7372	−73	336	+13	77	194	4		
		7371	−46	3	+13	50	97	6		
		7370	−12	37	−13	13	24	2		
		7373	+62	111	+17	66	24	3		
				(49)	(−7)		484	22		
Feb. 13	11 14	7374	−58	338	+19	62	388	9	G	Do.
		7372	−57	339	+13	60	242	3		
		7371	−32	4	+13	38	97	3		
		7370	+2	38	−13	7	97	14		
				(36)	(−7)		824	29		
Feb. 14	10 50	7374	−44	339	+19	50	485	14	F	do.
		7372	−43	340	+13	48	242	4		
		7371	−19	4	+13	27	73	1		
		7370	+16	39	−13	17	48	9		
				(23)	(−7)		848	28		
Feb. 15	11 4	7374	−31	339	+18	40	485	9	F	Mt. Wilson.
		7372	−29	341	+13	36	194	2		
		7371	−5	5	+13	21	61	1		
		7370	+35	45	−13	35	24	1		
				(10)	(−7)		764	13		
Feb. 16	10 59	7374	−18	339	+17	30	436	8	G	Do.
		7372	−16	341	+13	26	194	2		
		7371	+7	4	+12	21	61	2		
		7375	+7	4	+4	14	12	1		
				(357)	(−7)		703	13		
Feb. 17	16 5	7374	−2	339	+17	25	388	8	F	U. S. Naval.
		7372	+1	342	+13	22	194	1		
		7371	+24	5	+12	31	48	2		
				(341)	(−7)		630	11		
Feb. 18	10 59	7374	+9	339	+17	26	388	14	VG	Mt. Wilson.
		7376	+10	340	−13	12	48	16		
		7372	+11	341	+12	22	194	1		
		7371	+35	5	+12	40	24	3		
				(330)	(−7)		654	34		
Feb. 19	12 28	7377	−68	248	+7	70	48	6	G	U. S. Naval.
		7374	+21	337	+17	32	12	2		
		7376	+24	340	−13	24	145	16		
		7372	+25	341	+12	31	194	1		
		7374	+27	343	+17	37	242	1		
		7371	+49	6	+12	52	12	1		
				(316)	(−7)		653	27		
Feb. 20	10 52	7377	−53	251	+8	55	145	15	G	Do.
		7376	+37	341	−13	37	388	26		
		7372	+38	342	+12	42	194	1		
		7374	+39	343	+17	46	194	2		
		7371	+62	6	+12	65	12	1		
				(304)	(−7)		933	45		
Feb. 21	10 28	(*)	−71	220	−15	72	24	2	G	Do.
		7377	−39	252	+9	42	145	19		
		7376	+50	341	−13	50	339	19		
		7372	+51	342	+12	55	194	1		
		7374	+52	343	+17	57	194	1		
				(291)	(−7)		896	42		

See footnotes at end of table.

POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR FEBRUARY 1942—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1942	h m		°	°	°	°				
Feb. 22	11 6	7378	−82	196	+9	82	1,309	3	F	Do.
		7377	−27	251	+8	31	97	11		
		7377	−20	258	+10	27	48	4		
		7372	+65	343	+12	67	194	1		
		7374	+66	344	+17	70	194	1		
		7376	+67	345	−14	67	242	1		
				(278)	(−7)		2,084	21		
Feb. 23	10 33	7378	−69	196	+9	71	1,697	8	G	Do.
		7377	−13	252	+7	20	97	11		
		7377	−7	258	+10	18	24	1		
		(*)	+3	268	+15	23	12	1		
		7372	+78	343	+12	79	194	1		
		7374	+79	344	+17	80	194	1		
		7376	+82	347	−14	82	242	1		
				(265)	(−7)		2,460	24		
Feb. 24	12 27	7380	−70	181	−11	70	145	7	G	Do.
		7378	−55	196	+9	58	1,842	14		
		(*)	−51	200	−4	51	48	1		
		7379	−47	204	−9	47	48	2		
		7377	+1	252	+6	13	145	13		
		7377	+8	259	+9	18	24	1		
				(251)	(−7)		2,252	38		
Feb. 25	10 51	7381	−80	158	+8	80	48	1	F	Do.
		7380	−57	181	−12	57	97	4		
		7378	−42	196	+9	45	1,891	24		
		7379	−33	205	−10	33	97	10		
		7377	+16	254	+6	21	194	19		
		7377	+23	261	+9	28	24	1		
				(238)	(−7)		2,351	59		
Feb. 26	13 29	7381	−67	157	+8	69	48	1	G	Do.
		7380	−44	180	−12	44	97	3		
		7378	−28	196	+9	32	1,891	24		
		7379	−20	204	−10	20	145	8		
		7377	+30	254	+6	34	194	21		
				(224)	(−7)		2,375	57		
Feb. 27	10 46	7381	−53	159	+8	55	48	2	G	Do.
		7380	−29	183	−12	29	73	3		
		7378	−16	196	+9	23	1,745	25		
		7379	−7	205	−10	7	291	16		
		7377	+44	256	+6	46	194	21		
				(212)	(−7)		2,351	67		
Feb. 28	10 59	7381	−39	160	+8	42	48	1	VG	Do.
		7380	−16	183	−12	16	48	2		
		7378	−3	196	+9	17	1,745	45		
		7379	+6	205	−10	6	291	16		
		7377	+56	255	+6	58	194	20		
				(199)	(−7)		2,326	84		

Mean daily area for 28 days=1,095.

*=Not numbered.
VG=Very good; G=good; F=fair; P=poor.

PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR JANUARY 1942

[Based on observations at Zurich, or Locarno (bold-face type) as indicated. Data furnished through the courtesy of Prof. W. Brunner, Eidgenössiches Sternwarte, Zurich, Switzerland]

January 1942	Relative numbers	January 1942	Relative numbers	January 1942	Relative numbers
1	46	11	**69**	21	**23**
2	*d* 41	12	48	22	**20**
3	*Ec* **47**	13	*d* 56	23	*Mc* 31
4	*d* 39	14	**42**	24	**32**
5		15	**31**	25	**33**
6	*Ecc* —	16	**20**	26	10
7	*a* —	17	**14**	27	8
8	**75**	18	*d* **21**	28	0
9	*a* **77**	19	*a* **20**	29	*d* 11
10	*aa* **44?**	20	18	30	22
				31	20

Mean, 28 days=32.8

a=Passage of an average-sized group through the central meridian.
b=Passage of a large group through the central meridian.
c=New formation of a group developing into a middle-sized or large center of activity; E, on the eastern part of the sun's disk; W, on the western part; M, in the central circle zone.
d=Entrance of a large or average-sized center of activity on the east limb.

PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR FEBRUARY 1942

[Based on observations at Zurich, or Locarno (bold-face type) as indicated. Data furnished through the courtesy of Prof. W. Brunner, Eidgenössiches Sternwarte, Zurich, Switzerland]

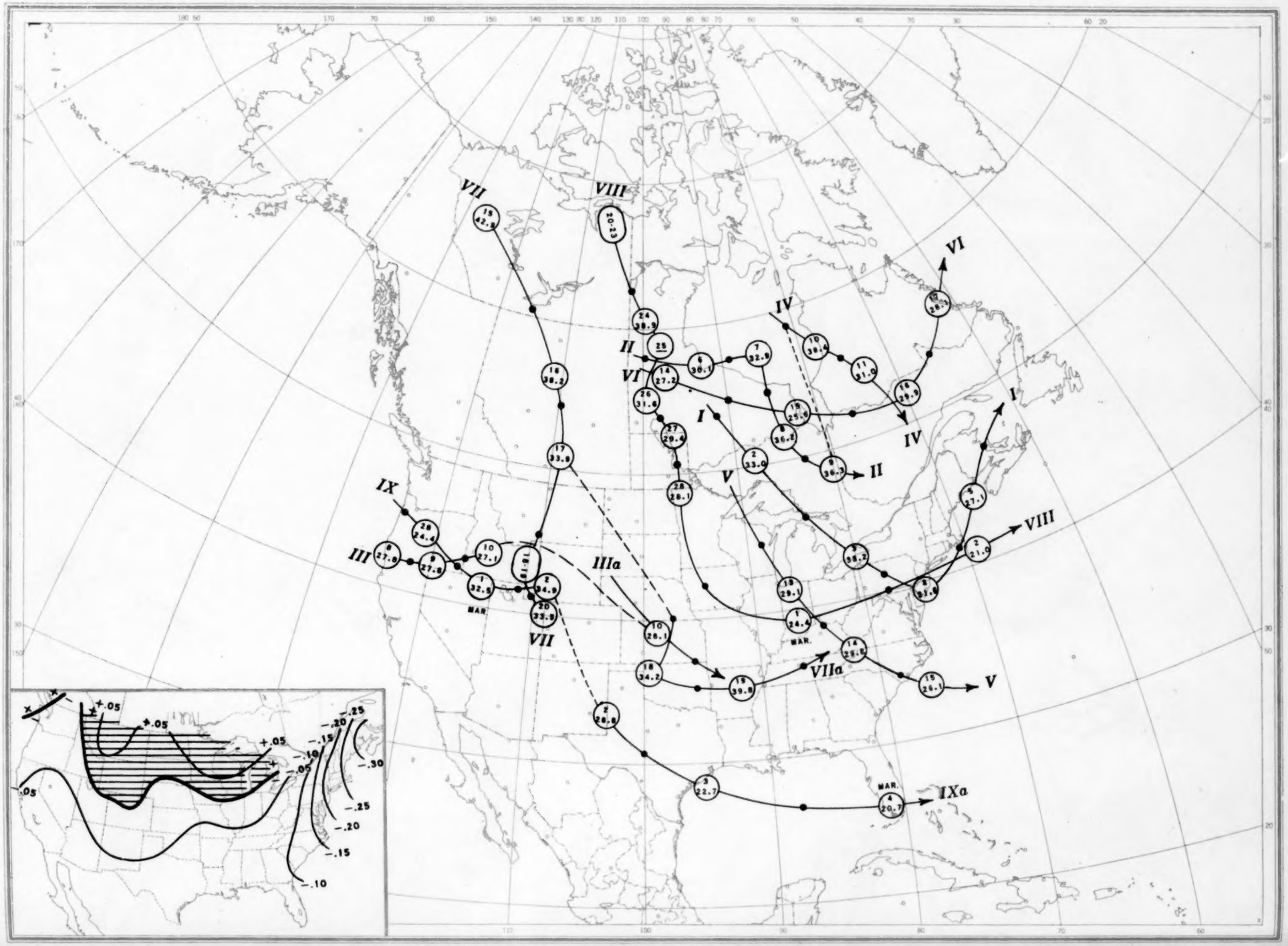
February 1942	Relative numbers	February 1942	Relative numbers	February 1942	Relative numbers
1	**19**	11	*d* 30	21	**47**
2	**22**	12	46	22	*d* 41
3	*Macc* 41	13	**54**	23	**53**
4	*a* **63**	14	44	24	*Mac* 65
5	**54**	15	52	25	**73**
6	*Mc* **94**	16	37	26	**61**
7	**79**	17	*aa* 38	27	*a* **50**
8	**64**	18	**39**	28	*b* **98**
9	**41**	19	*EMcc* 40		
10	*d* 34	20	**74**		

Mean, 28 days=51.9

a=Passage of an average-sized group through the central meridian.
b=Passage of a large group through the central meridian.
c=New formation of a group developing into a middle-sized or large center of activity; *E*, on the eastern part of the sun's disk; *W*, on the western part; *M*, in the central circle zone.
d=Entrance of a large or average-sized center of activity on the east limb.

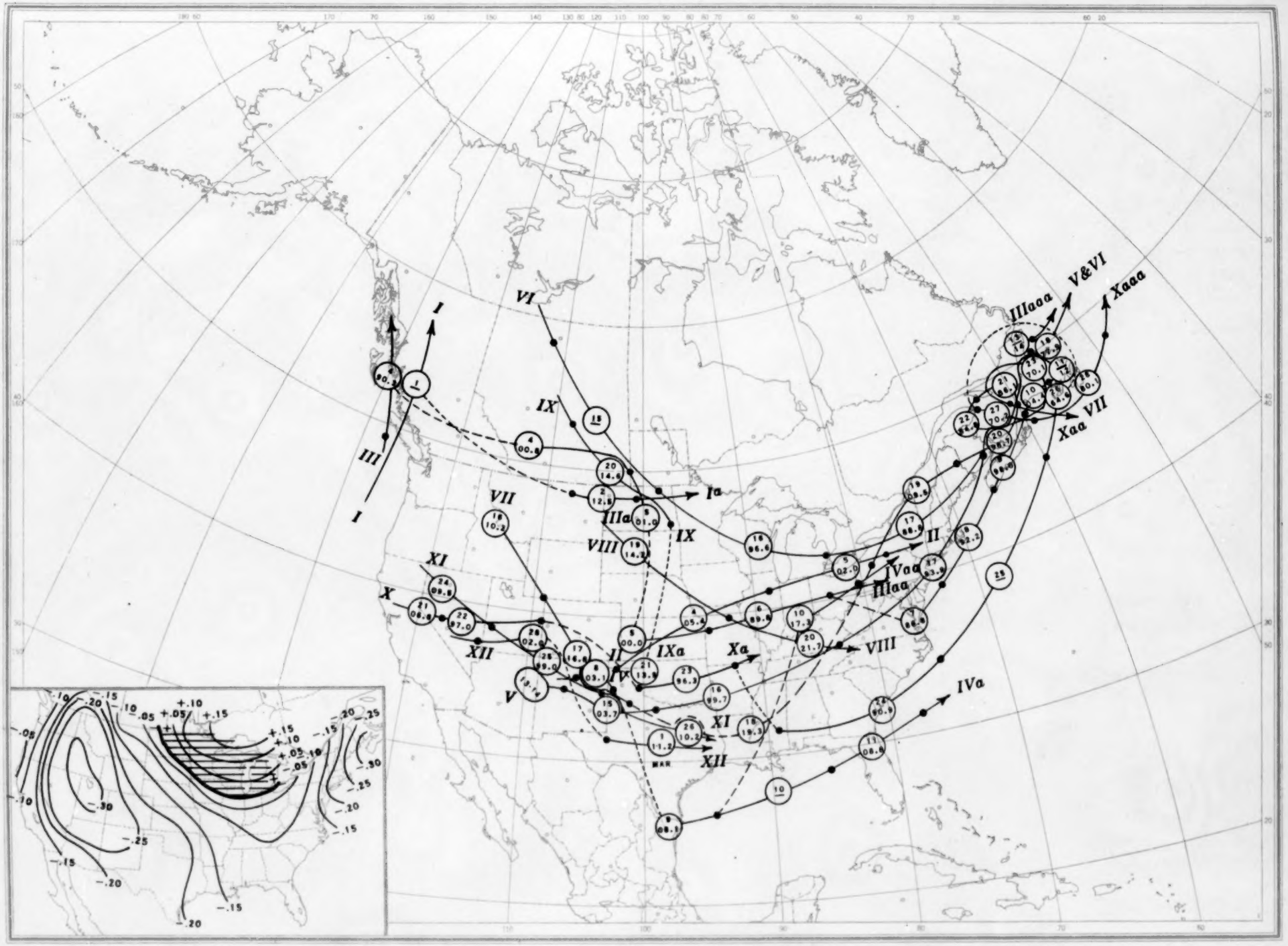
Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, February 1942

Chart II. Tracks of Centers of Anticyclones, February 1942. (Inset) **Departure of Monthly Mean Pressure from Normal**



Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time).

Chart III. Tracks of Centers of Cyclones, February 1942. (Inset) Change in Mean Pressure from Preceding Month



Circle indicates position of cyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of cyclone at 7:30 p. m. (75th meridian time).

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, February 1942

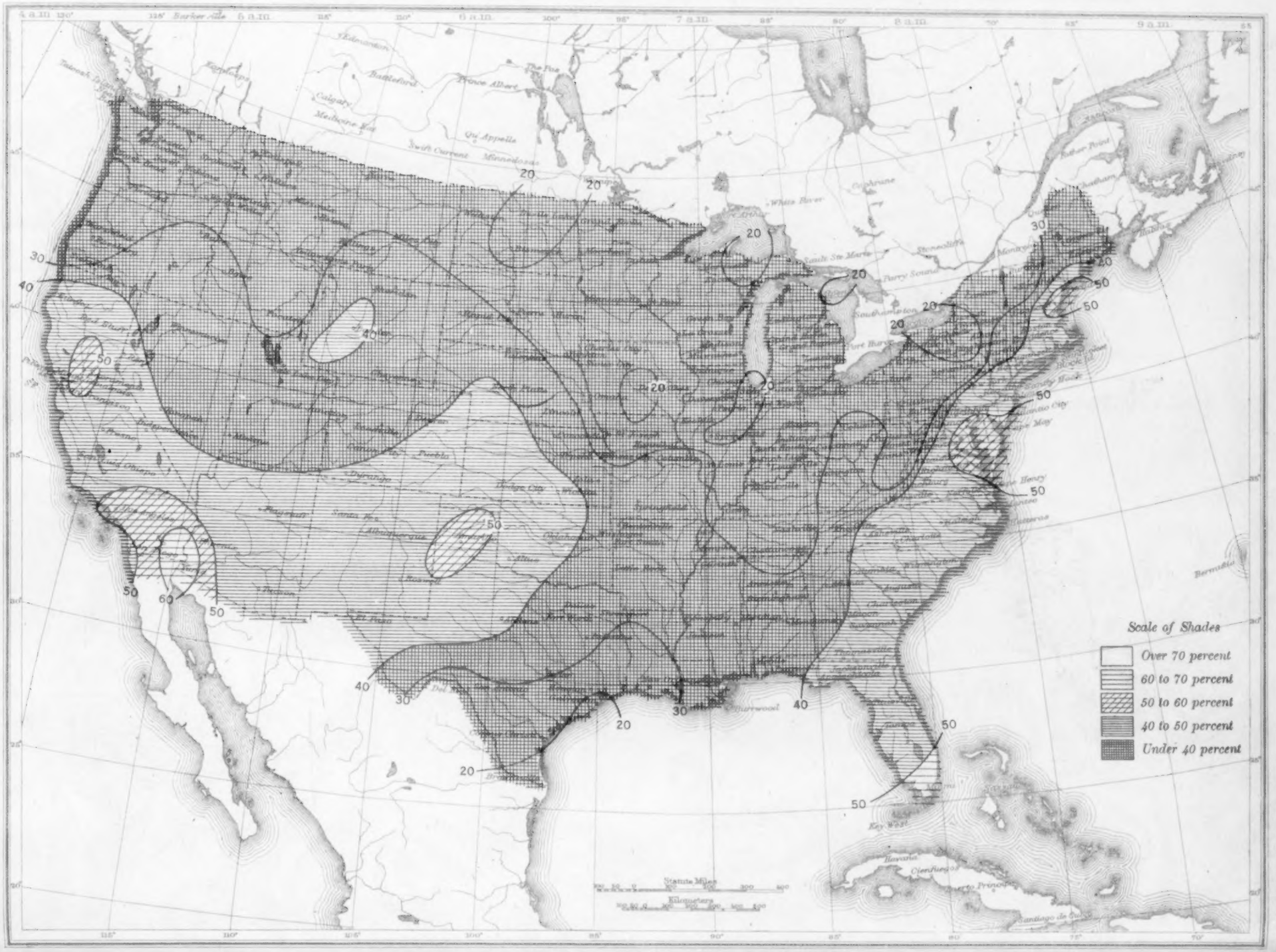


Chart V. Total Precipitation, Inches, February 1942

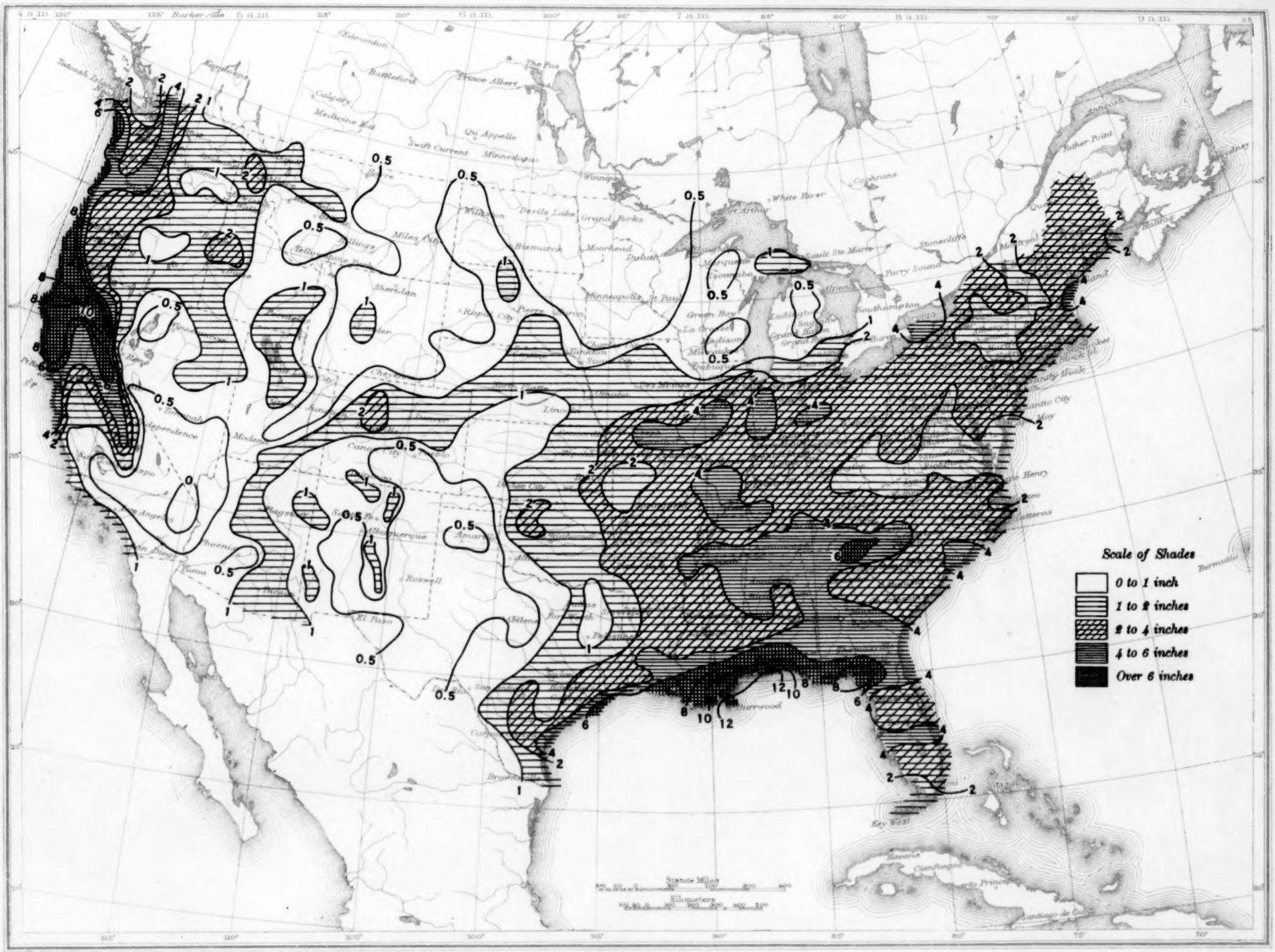


Chart VI. Isobars at Sea Level and Isotherms at Surface; Prevailing Winds, February 1942

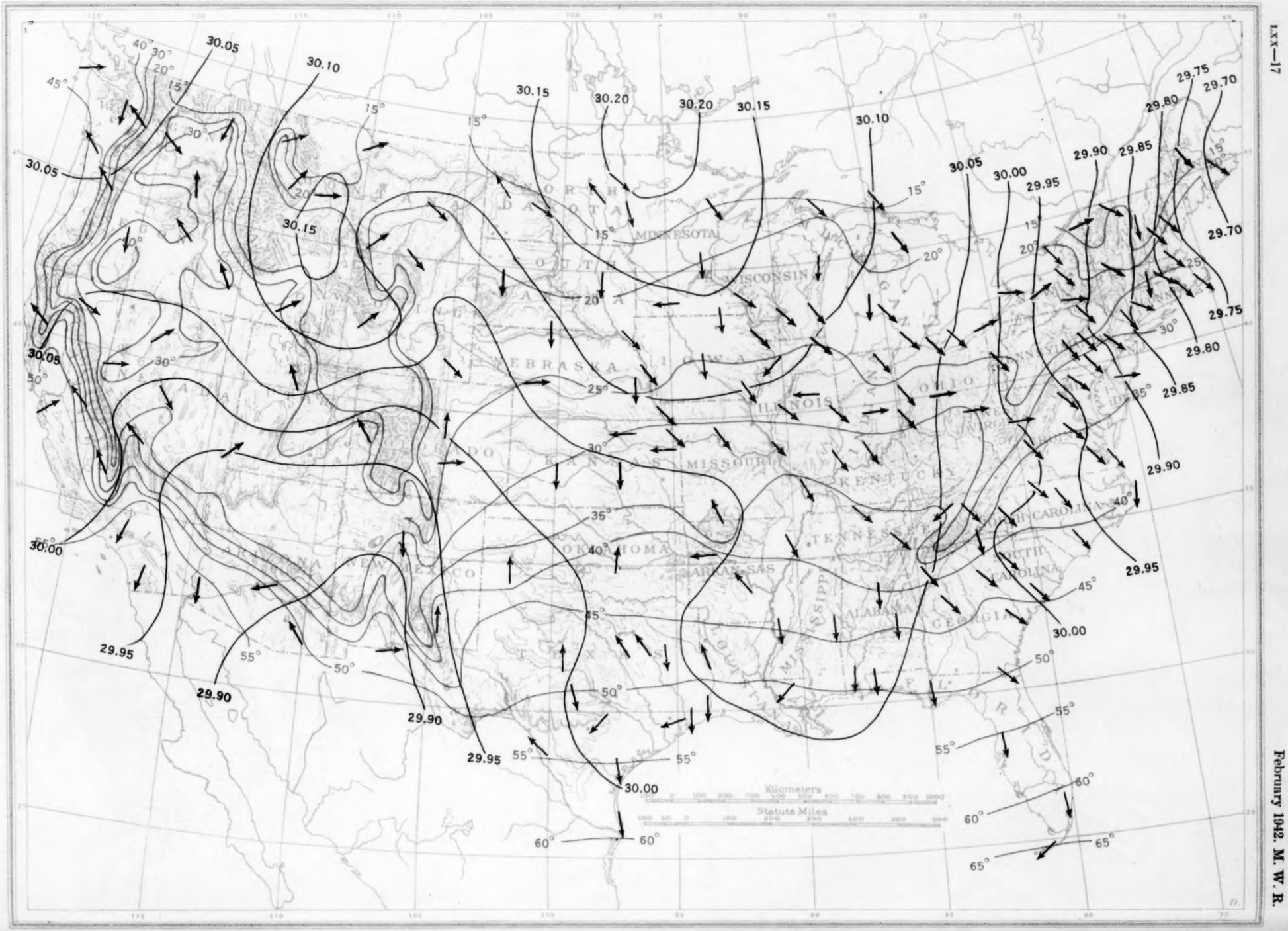


Chart VII. Total Snowfall, Inches, February 1942. (Inset) Depth of Snow on the Ground at 7:30 p.m., Monday, February 23, 1942

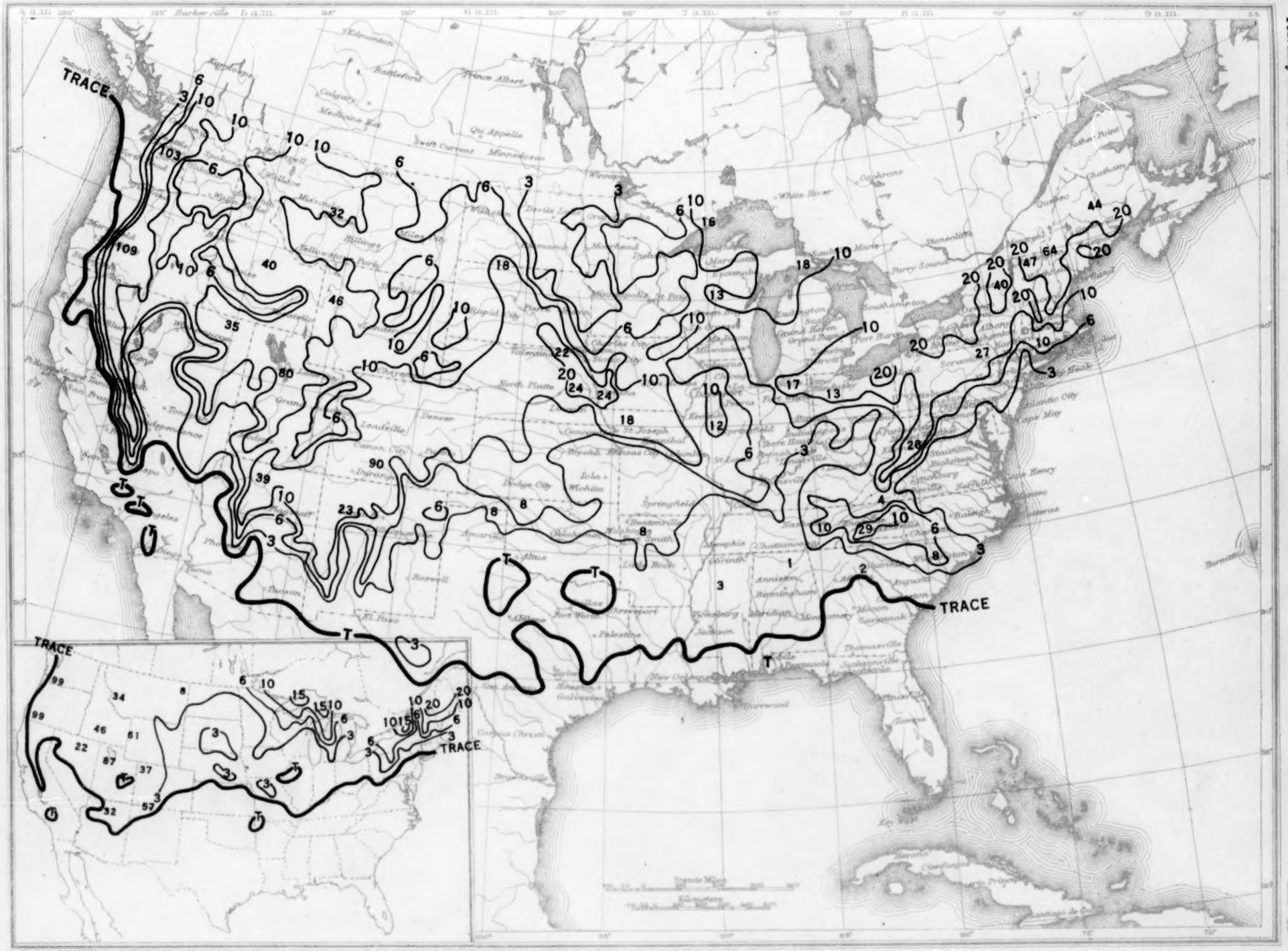


Chart VIII. Isobars (mb) for 1,524 Meters (5,000 ft.) and Isotherms (°C.) and Resultant Winds for 1,500 Meters (m. s. l.) February 1942

Isobars and isotherms based on radiosonde observations at 11:00 p. m. (E. S. T.) and winds based on pilot-balloon observations at 5:00 a. m. (E. S. T.).

Chart IX. Isobars (mb) Isotherms (°C.) 11:00 p.m. (E.S.T) and Resultant Winds 5:00 a.m. (E.S.T.) for 3,000 Meters (m.s.l.) February 1942

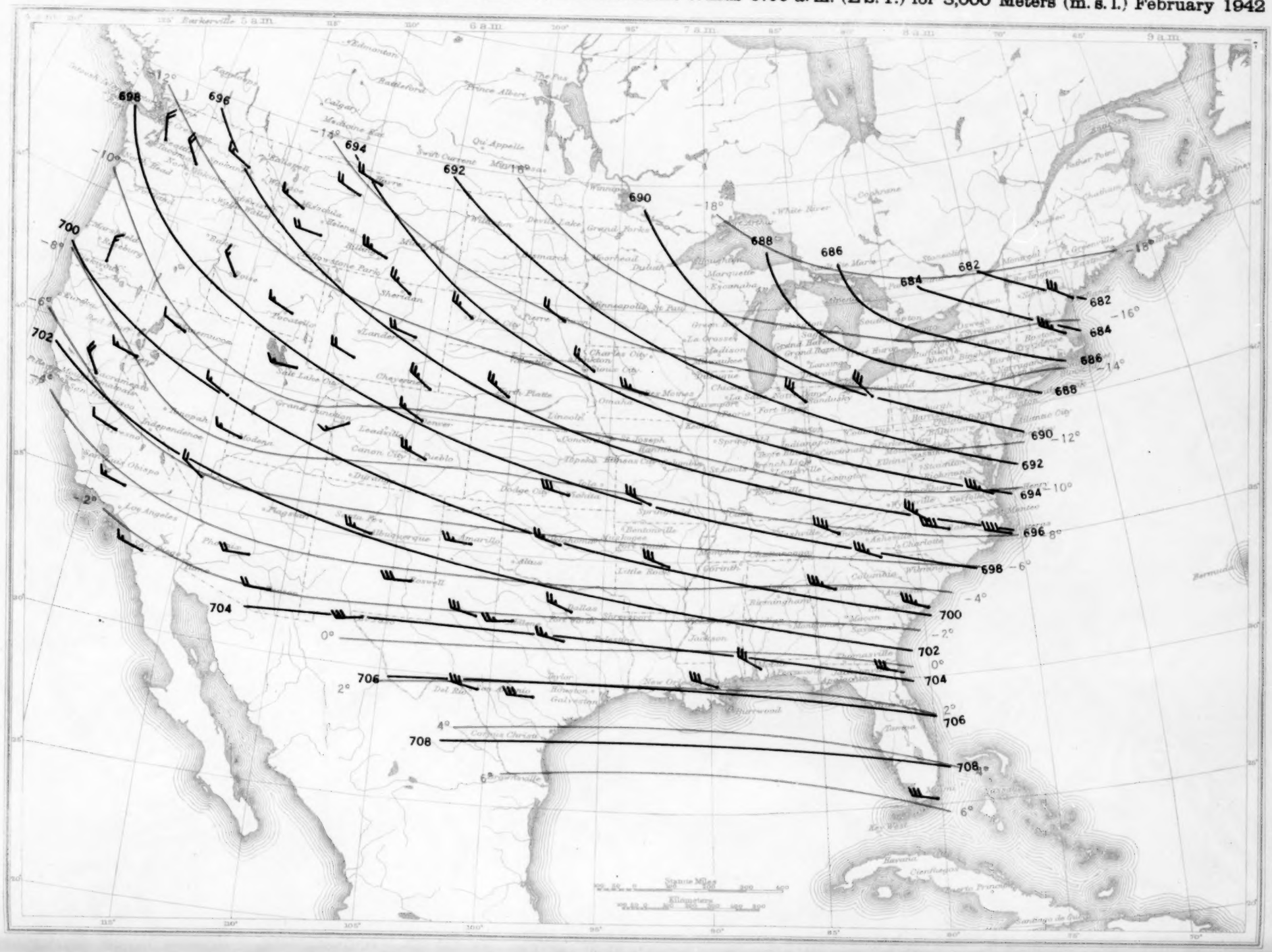


Chart X. Isobars (mb) Isotherms (°C.) 11:00 p.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 5,000 Meters (m.s.l.) February 1942

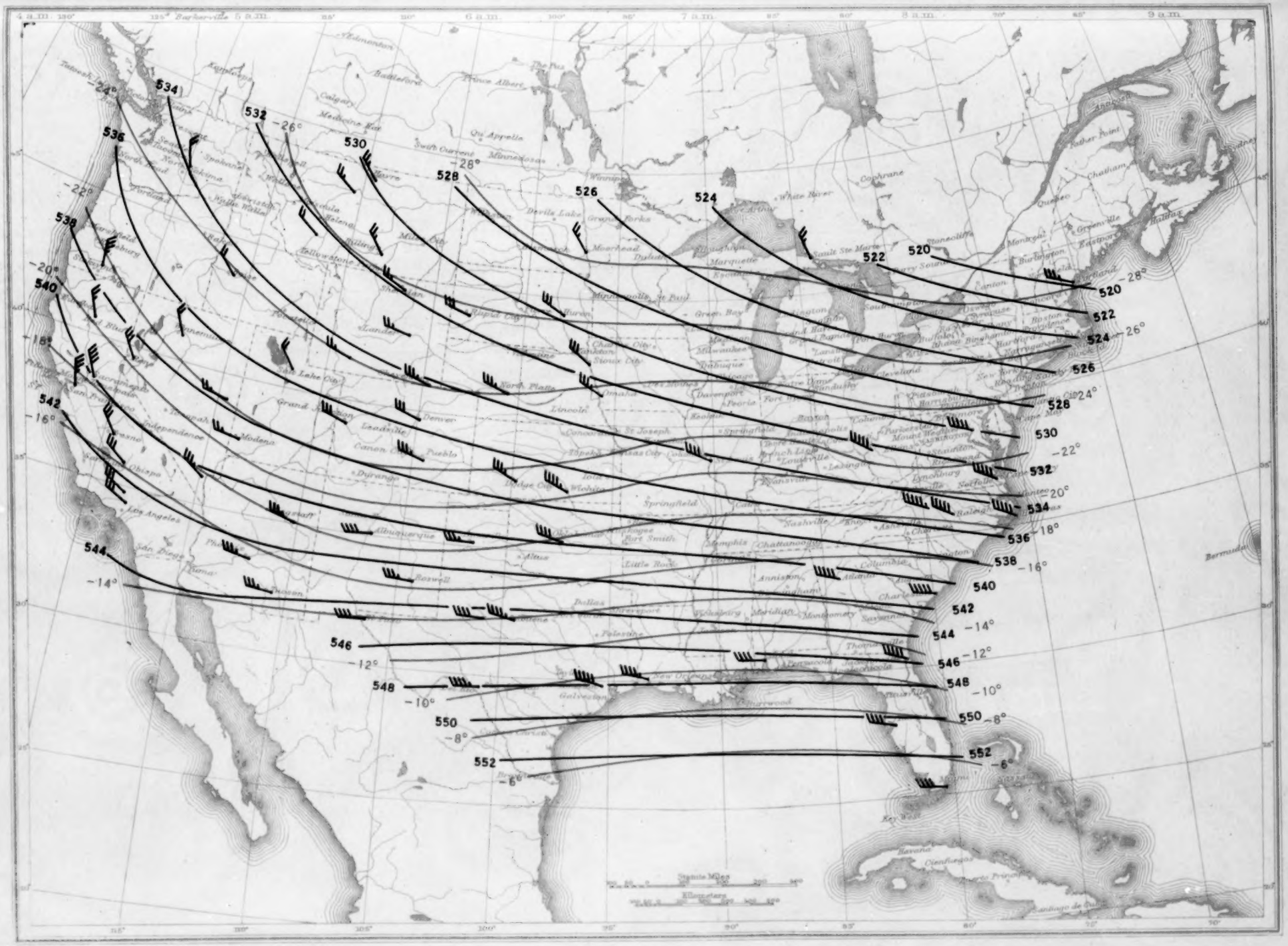
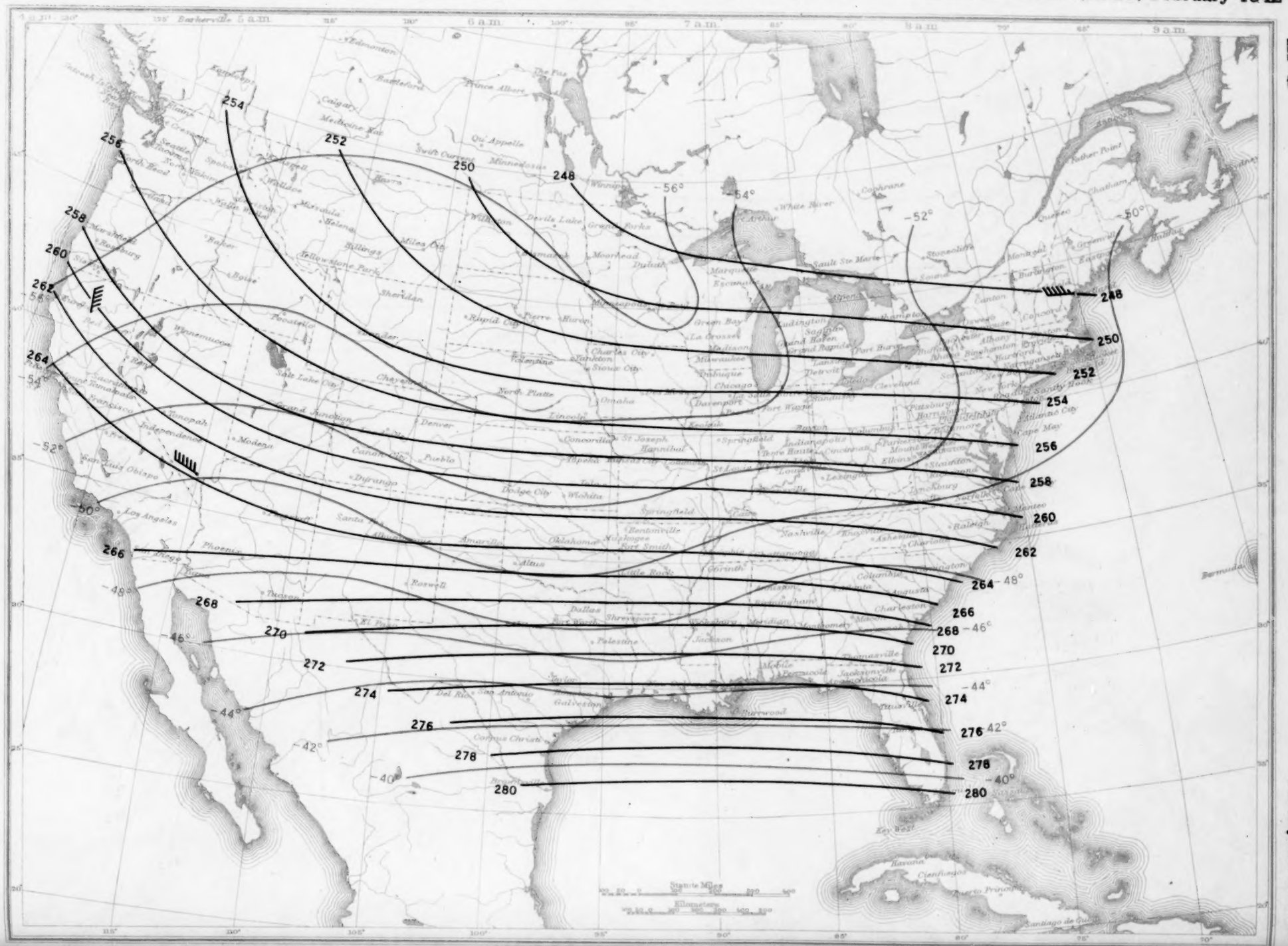



Chart XI. Isobars (mb) Isotherms (°C.) 11:00 p.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 10,000 Meters (m.s.l.) February 1942